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AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

VOLUME XII JUNE 4, 1923 NUMBER 12

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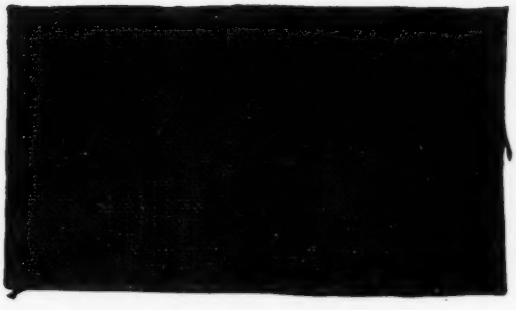

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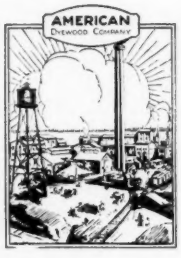

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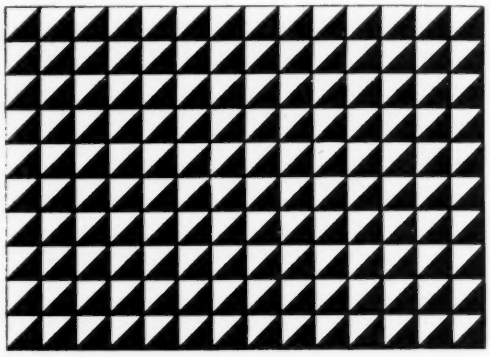

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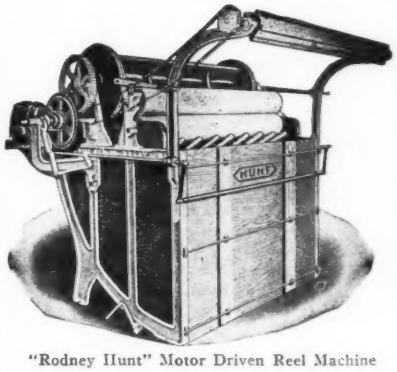

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VOLUME XII NEW YORK, JUNE 4, 1923 NUMBER 12

Continuous Bleaching

A Dream or a Reality?—Attacking the Problem at Its Weakest Points—the Continuous Piling Machine —Making Souring and Chemicking Continuous—Speeding Up the Boil—Details of Operation— Cutting the Time of Heating Up—Elimination of Irregularities—Liberation of the Bleacher

By W. L. CONRAD

Consulting Engineer, New York City

THE dream of the progressive bleacher has always been for a process by which his strand of fabric would travel from the gray room through automatic machines in which it was properly treated by standardized solutions until it finally landed in a white bin or was wound up on rolls.

The advantages to be derived from such a continuous process are so evident and so great that hundreds of thousands of dollars have been spent to perfect one. When, several years ago, the writer first became interested in the art of bleaching, this dream came into his head also, and he asked himself the following questions:

1. Is it possible?
2. If possible, why has it not been done?

For a long time he was unable to answer the first question, and consequently the second was entirely beyond him. To-day, however, he feels that he can answer both and, while he is not ready to offer a solution complete in all its details, yet his progress is such that he feels warranted in making public the results so far accomplished. While the problem has been uppermost in his mind for many years, he has never attempted to solve it as a whole, but has continually attacked those portions whose solution seemed comparatively easy, leaving for the future those whose solution seemed difficult or doubtful.

The Continuous Piling Machine

The evident advantage of eliminating boys, with their dirt, damages and wages, from sour and chemic piles seemed so great that attention was directed to developing an apparatus that would accomplish this object. This was accomplished through the introduction of the Gantt continuous piling machine.

There are now hundreds of such machines in use. The fabric is dropped continuously into the tall stack, and forms a pile resting on the bottom, or on rollers at the bottom. As the pile increases it moves downward by its own weight and the forward end is turned upward in the short stack, from which the fabric is continuously withdrawn.

These machines have been found satisfactory for both sour and chemic piles, and in one plant have replaced over fifty boys, whose wages even at $2 per day would amount to approximately $30,000 per year, and the saving in the elimination of the dirt and damages amounts to at least as much more.

To be sure that the fabric will not tangle when it is being withdrawn, the sectional area of the stack should be governed by the weight of the fabric that is to be treated. Light weight fabric piled into a large stack is much more liable to tangle while it is being withdrawn than if it were piled in a stack of smaller sectional area. On the other hand, heavy fabric can be piled in a large stack and withdrawn satisfactorily.

If approximately one weight of fabric only is to be piled in a stack, it can usually be made to hold from 5,000 to 10,000 yards, depending on the head room. If, on the other hand, it is desired to hold more than this amount of fabric in the pile, or to pile several kinds of fabric varying greatly in weight in the same apparatus, in order to give more time for the chemicals to act, it is better to pile it down systematically in a series of these machines. It has been found that usually three or four of these machines placed in tandem and the fabric being continually withdrawn from one machine and piled into the next, and so on through the several machines, will give all the times necessary for chemical action, even with the heaviest goods, either in sour or chemic. The fact that the goods are exposed to the air at all times and are piled in a comparatively small stack greatly reduced the time necessary for chemical action.

Making Souring and Chemicking Continuous

These machines are designed to handle fabric in either the rope or the open width form, and work equally as well on one as the other, and are absolutely automatic, for in all cases the weight of the fabric piled in them furnishes the power for turning the leading end of the pile of fabric uppermost.

By means of this mechanism it is possible, without modifying the process in the least, to make souring and chemicking continuous operations, and to control absolutely the time every portion of the goods is acted on by the sour or chemic.

These machines not only make it possible to do away entirely with the ordinary sour and chemic piles and the attending boys with their dirt, damages and wages, but prevent the possibility of having the goods remain an undue length of time at the bottom of a sour or chemic bin, and they give us a cheaper, quicker, less wasteful and more uniform process than it is possible to get with the ordinary method of piling.

These machines also have been used in the place of the white bins and by this means the goods are moved continuously from the kiers, through the several chemical operations, direct to the cans or drying machines, where they are delivered to the finishing departments, bleached, dried and batched up on rolls.

They have been found to be of great value in the knit goods industry in doing away with the piling of the goods in trucks between the various chemical operations, and here not only do they do away with the trucks and men necessary to operate the trucks, but they make available, for productive work, the great amount of floor space usually occupied by these trucks.

Speeding Up the Boil

These machines solve the easier half of the problem and bring us face to face with the subject of boiling, which is the key to all successful bleaching.

The great obstacle to making this operation continuous is undoubtedly the long time that it has been thought necessary to boil goods. The question of whether such a long time was necessary at once arose, and, as it was found that some kiers did better work than others in half the time, it was naturally asked if even in these the minimum time had been reached. Investigation showed that a very important difference between the long-time kiers and the short-time kiers was the better circulation in the latter, and the effect of a better circulation still was at once tried, with surprising results. By systematically piling the fabric in layers in boiling liquor in such a manner that the bottom layer could be continuously withdrawn and spraying the top layer as it was piled down with the hot liquor, there was effected better boiling in two hours than was being done in the open vomiting kier in twelve.

The next step was to build a machine of a type that would increase the circulation again and to deliver the hot liquor on top of the pile in powerful streams which continuously traveled back and forth across the pile as it was formed, and exerted a strong scouring action on the pile. With this machine it has been possible again to cut the time of boiling in half, and two one-hour boils are better in such a machine than two twelve-hour boils in the open kier.

In the first machine of this type built, excellent boiling for white work has been done on light goods by two half-hour caustic boils. The efficiency of this method can be greatly increased by placing two or more of these machines in tandem.

Details of Operation

The fabric passes through the kiers in this order: First, second, third—being squeezed after each boil while the fresh caustic is delivered into the third machine from which it goes to the second and then the first, it being repeated and circulated in each kier.

In the first kier the size and the more readily removable gums and waxes are taken out and go off in the waste liquor. The squeezed fabric enters the second and third kier, being subjected in each to the same violent scouring action by the cleaner liquor, with the result that when it emerges from the third kier and heaviest fabric has had a very thorough cleansing and is ready for the action of the chemic.

A little consideration of the subject of boiling will show that these results are not as radical as they seem to be at first. Take, for instance, the open vomiting kier ten feet in diameter and ten feet deep, in which the fabric is piled by a boy who lays it as he pleases (for no foreman can watch him) and packs it tightly with his feet. How long after steam is admitted is it before that kier is boiling hot all through? May there not be some portions of that kier so closely packed that but little circulation occurs in them? We know by the variation of the color of the boiled fabric as it comes out that this is so. The object of the long boil is largely to reach these closely packed spots.

Cutting the Time of Heating Up

In the closed kier, with mechanical circulation, now generally used, the time of boiling has been cut in half, over that of the open kier; but a portion of this time is also used in heating up kiers and, as the same irregular packing occurs, closed kiers do not always give us uniformly boiled goods by any means.

In the kier described no time is lost in heating up, the piling is uniform, and there are no spots that resist circulation and, as every fabric is thoroughly permeated by the boiling liquor the instant it enters the kier, the results should be perfectly uniform when the kier is prop-

erly operated. Again, in this kier fresh liquor is being continually added and the foul liquor withdrawn, while in all other kiers the same liquor is circulated until the boil is completed.

The uniform piling in these kiers insures that the initial permeation of the fabric by the liquor and the subsequent circulation shall also be uniform.

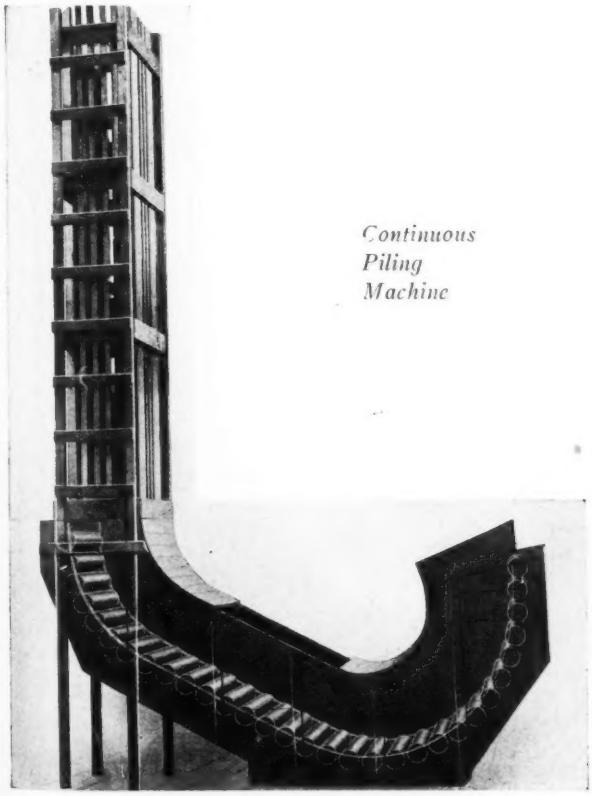
By the proper arrangement of these machines together with the Gantt continuous piling machine, the goods can be made to travel continuously from the gray room to the white bins, or rolled up after the drying cans, without interruption, handling or breaking a seam.

Elimination of Irregularities

The evident advantage of such a process are: Saving in time, saving in wages, increased output and greater uniformity in product, but there is one advantage, dependent on the fact that all operations are continuous and mechanical, which far outweighs all the others. Irregularity in bleaching is not usually due to lack of knowledge, but to the impossibility of getting all of the operations performed exactly as we know they should be. It is a most difficult thing to get a number of men (or boys, as is usually the case in a bleach house) to do continuously as they are told, and it may be safely assumed that it is the exception rather than the rule when all the operations on a lot of goods are performed even approximately as they should be. We have seen the variation in the strength of the sour of over 400 per cent and in a chemic of nearly 200 per cent, and these facts were observed in a bleachery which not only had a good reputation, but which was actually turning out what was considered good work.

If all portions of a lot of goods are treated even approximately as they should be, not only is a uniformity obtained that is practically perfect, but a color which is far superior to that usually achieved.

As long as the quality of the product is dependent upon having a number of workmen constantly attentive to their work, anything like perfection will be impossible.



Continuous Piling Machine

Liberation of the Bleacher

The bleacher's principal work to-day is directing a large number of low-grade workmen. If we can make all of the operations mechanical and automatic, we can replace this large group of low-grade workmen by a much smaller number, capable of operating automatic machines, then the bleacher will be able to devote practically all of his time to seeing that the strength of his solutions is correct, and that all operations are being properly performed. The quantity of work turned out by this method depends entirely upon the time the machines run, and if a good mechanic keeps them in proper running condition, the amount of work done is a maximum and the bleacher can devote all his time to seeing that it is properly done.

The mechanism described is so designed that it is not necessary for a plant to install the complete equipment at one time in order to get the benefits of the installatoin. Many plants have already installed the first part of the method described here, namely, the machines for automatically piling the goods between the chemical operations, and the results that have been accomplished speak for themselves.

Nor is it necessary to rebuild or change the bleach house, or change in any way the mechanical arrangement of the plant, except to remove the bins now used for sour and chemic. And the installation of these machines causes no change whatever to be made in the chemical arrangements of the plant from what they now are.

The instruction of this continuous method which has been made possible by the use of the Gantt continuous piling machine and later by the addition of the Gantt continuous kier, would make it appear as if the dream of the progressive bleacher had at last come true and that, from a business standpoint, the continuous process of bleaching had become a fixture in the textile finishing industry.

The most important industry in the St. Croix Valley, New Brunswick, is the manufacture of ginghams, shirtings and dress goods. There are 1,548 looms and 55,000 spindles, with 850 operatives and an annual output of $2,000,000 which is marketed in Canada. All the raw material, long staple cotton, is purchased in the United States.

The Waterproofing of Textile Fabrics

With Special Reference to the Tate Electro-Chemical Process

Mechanical Waterproofing—Technical Methods of Mechanical Waterproofing—Chemical Waterproofing—Technical Methods—Waterproofing with Aluminum Acetate—Electro-Chemical Waterproofing—The Tate Process—Principles—The Waterproofing Machine—Preliminary Treatment—Properties of Treated Cloth—Converting Cotton and Waterproofing Wool

By ISMAR GINSBERG, B.Sc., Chem.

THE four principal textile fibers, wool, cotton, linen, and silk, possess one property in common. They are all pervious to water; that is, they readily absorb water and allow it to penetrate through their structure. Of course, the fibers do not all possess this property in the same degree. Wool is perhaps most resistant to the passage of water due to the fact that it contains a certain proportion of natural greases and fats, which makes it possible for the fiber to resist the penetration of water rather well. But cotton and linen, and silk as well, do not offer any great resistance to the penetration of water; in other words, they are far from being waterproof.

This fact was realized almost as early as the first spinning of these fibers into cloth. The fabrics were found to possess similar properties to the fibers, and for certain purposes this is a decided disadvantage. There are many uses to which textile fibers are put wherein they must possess some degree of waterproofing in order to be able to perform their functions properly. Raincoats and out-of-door clothing do not represent the only uses for waterproofed fabrics. Awnings, tent cloths, sail cloths, coverings of various sorts, made from textiles, also must possess the property of resisting the penetration of water. The field for waterproofed textiles is a wide one.

Mechanical Waterproofing

There are in all three main divisions into which waterproofing processes can be divided. The first class, and the one which was developed first, is known as mechanical waterproofing. The processes that are included in this class are based on the principle of the precipitation or incorporation of water-resistant materials within the textile fabric or fiber in the course of the spinning of the cloth. There is a great variety of substances, which are water-repellent and these processes consist merely of first dissolving the waterproofing agent in a suitable solvent or converting it into a suitable form for use, and then passing the textile fabrics through the same, and finally precipitating the solid matter on the fibers by one method or another, or simply by allowing the volatile solvent to evaporate and leave behind the water-repellent substance.

Rubber and gutta-percha have been used and are still used to a considerable extent in making waterproofed textiles. The substances are dissolved in a solvent and then smeared or rolled over the fabric. On evaporation of the solvent the rubber remains adhering to the textile fiber. It is also possible to waterproof fabrics by passing them through rubber or gutta-percha solutions. It is seldom that rubber and gutta-percha are used alone for this purpose. They are generally mixed with other materials, such as pitches, rosins, waxes, varnish, linseed oil, oils, resins and similar substances, all of which possess water-repellent properties to a certain degree. Gelatine solutions are also used for this purpose. After the textile has received a coating of gelatine, the latter is rendered insoluble in water by passing the fabric through a bath of formaldehyde or potassium chromate, etc.

While the coating and impregnation of textile fabrics with these materials undoubtedly renders them waterproof, it also endows them with disadvantageous properties. Thus, for example, the fabrics treated with linseed oil varnishes or other similar varnishes and lacquers become stiff and heavy. They crack readily, and as soon as that happens the waterproof properties of the fabric are destroyed. Probably the best process of mechanical waterproofing is rubberizing. Rubberized cloth is perfectly waterproof, possesses comparatively long life and will not crack except after prolonged wear. But it has one rather serious drawback, particularly when the fabric is employed to make clothes. Rubberized cloth is not only impervious to water, but to gases and air as well. The result is that a rubber coat is perfectly non-ventilating. When worn on a hot day, it is very uncomfortable, for no air is allowed to pass through the coat and cool off the perspiring skin. This is an important disadvantage, which mitigates strongly against the use of rubber coats and rubberized clothing in general. Furthermore, it must also be remembered that the weight of the fabrics is materially increased by the rubberization, and that this is an additional disadvantage.

Technical Methods of Mechanical Waterproofing

A sample composition, used in mechanical waterproofing textiles, consists of five parts of rubber, five parts of coal tar, ten parts of linseed oil, five parts of fatty oil, 25 parts of sugar of lead, five parts of alum and five parts of pyrolusite. This mixture is mixed with twenty-five parts of hot turpentine. It is applied to the fabric by means of a brush. In using paraffine as a waterproofing agent, the paraffine is either dissolved in light petroleum or other volatile solvents and the fabrics are immersed in the solution. The solid matter is left behind when the solvent evaporates. Sometimes the paraffine is applied in the melted condition by means of a rotating metallic roller, which is in contact with the solid paraffine, so that it carries away parts of it and applies them on the fabric, which passes between the roller and a heated trough. The latter fuses the paraffine so that it is soaked up by the fibers. The goods are then calendered.

In waterproofing with gelatine, tannin or alum may be used to render the former insoluble. Cotton goods may be treated with 1.5 kilograms of gelatine in 50 liters of boiling water, containing 1.5 kilograms of soap chips and 2.5 kilograms of alum. The cotton fabric is put through the solution at 50 deg. Cent., dried and then calendered. Sails, tarpaulins, etc., can be waterproofed by saturating them with a 7 per cent gelatine solution at 40 deg. Cent.; then air-drying, passing through a 4 per cent alum solution, air-drying, rinsing and final drying.

Waterproofied oiled fabrics are made by spreading over the material in several successive layers a paste consisting of half-raw and half-boiled linseed oil, mixed with mineral coloring matter. The material is dried between the successive applications. Driers, resins, petroleum, etc., are sometimes added. Casein is used for waterproofing by dissolving it in alkali solutions and impregnating the fabrics with these solutions and then precipitating the casein on the fabric in various ways.

Chemical Waterproofing

Chemical waterproofing of textiles consists in the treatment of the fabrics in successive baths of chemicals, resulting in the chemical precipitation of an insoluble chemical on the fiber and between the interstices of the fiber in the cloth. The chemical waterproofing methods possess one great advantage over the mechanical waterproofing processes, namely, that the pores of the fabrics are not covered over with an impervious coating of material which makes the cloth non-ventilating. Raincoats and clothing made from chemically waterproofed cloth are perfectly ventilating and can be worn without discomfort in hot weather.

But chemical waterproofing, no matter what the nature of the chemicals used may be, has one serious drawback. By the ordinary method of dipping the fabric into one solution after the other it is impossible to make the solutions penetrate into the fine capillary passages that are found in all textile fibers. The result is that the precipitate of insoluble matter formed after the cloth is passed into the second solution does not enter the internal structure of the fiber, but merely coats it with an external film. For this reason it is easy to remove the coating, by one means or another. For example, when the fabrics are washed, even though the film is insoluble in water, its insolubility is not great enough to resistant the action of rubbing and boiling in soap and water. Then again, chemically waterproofed fabrics cannot be dry-cleaned without the destruction of the waterproofing effect, for the insoluble films are soluble in the benzine of the dry cleaning soap. Hence, once a chemically waterproofed raincoat is dry cleaned, it is no longer waterproof.

Technical Methods of Chemical Waterproofing

There are many different methods of chemically waterproofing textiles. The principle of all these methods is the same. The cloth is first passed through a solution of one chemical and thoroughly impregnated, and then through a solution of another chemical, which, when it comes in contact with the first chemical, forms a precipitate. This precipitate is thrown down on the fiber and constitutes the water-repellent medium. In one method, for example, a solution of alum is made in one tank (15 parts of alum in 500 parts of water) and a solution of sugar of lead is made in another solution (15 parts of sugar of lead in 500 parts of water). The two solutions are mixed together with the formation of basic lead sulphate. After the precipitate has settled, the clear liquor, containing aluminum acetate, is drawn off. The fabrics are dipped into this solution and allowed to remain in contact with it for a period of four hours, and then dried and finished in the usual manner.

There are also various processes for obtaining waterproofed and fireproofed fabrics in one operation. To this end various copper salts may be deposited on the fibers. There are also processes in which rosin soaps are used and precipitated on the fibers by various chemicals. But probably the most efficient and best process of all is the one in which an insoluble soap is precipitated on the fibers.

Waterproofing with Aluminum Acetate

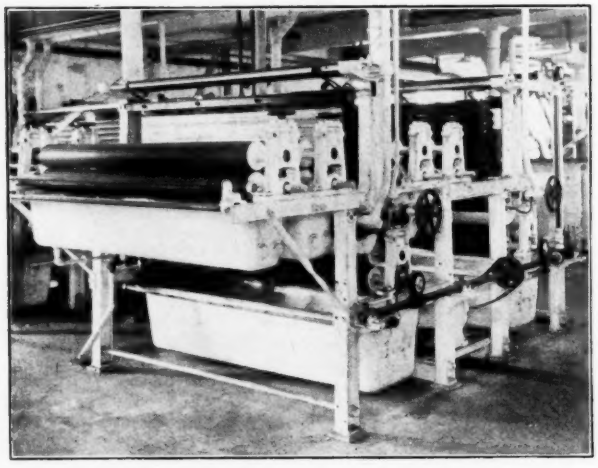
In waterproofing with aluminum acetate an aluminum soap is thrown down on the textile fibers. The fabric is first impregnated with a dilute solution of acetate of

alumina (5 deg. Be.) and then dried in hot air. Thereafter the fabric is drawn through a 5 per cent soap solution. The result is the precipitation of an insoluble aluminum soap, which renders the fabric waterproof.

Aluminum acetate plus sodium soap equals aluminum soap plus sodium acetate. As a trace of undecomposed soap remains in the fabric, and as this would give it a soapy, slippery feel, it is necessary to remove the soap by again passing the fabric through a solution of alum or aluminum acetate. Then the fabric is rinsed with water and dried. The sodium soap most commonly used is sodium oleate. Good results can also be obtained with sodium stearate and sodium palmitate.

Electro-Chemical Waterproofing of Fabrics

Within the past eight or nine years, another process of waterproofing textiles has been developed in which the aid of electricity is called upon to cause the waterproofing agents to enter the internal structure of the



The Tate Wool Proofing Machine

fibers. This process was invented by Alfred O. Tate, of New York City, in 1904. It was first employed in waterproofing the fabrics used in making the uniforms of the Canadian and American air forces during the war, and since the close of the same, within a comparatively short period of two years, it has developed into a commercial process of considerable prominence. At the present time the Tate process is being exploited on a very large scale in the plant of the Tate Electrolytic Textile Processes, Inc., at Cranston, R. I. This plant has a capacity of waterproofing 36,000,000 yards of wool, cotton, silk and linen fabrics per annum. The process has also extended to England, where an even larger plant is in course of construction.

Principle of Electrical Waterproofing

In discussing chemical waterproofing it was emphasized that it was a difficult, and in fact an impossible

The Waterproofing Machine

The waterproofing machine is shown in the illustration. There are two types of machines used in the process. Both are built identically alike, except that one is provided with two sets of electrodes while the other has four fabrics, and the second for cotton and linen textiles. The cloth is reversed once in the two-set machine and twice in the four-set machine.

The cloth first passes through a bath of sodium oleate and then between two superimposed rollers, which squeeze out the excess oleate solution and allow it to drop back into the trough. Then the cloth passes between the electrodes while the current is flowing. Before it goes through the second and succeeding sets of electrodes, the fabric passes through additional baths of sodium oleate (soluble soap) and squeeze rollers. At the end of the machine there are a series of drying cans, heated by steam, over which the fabric is carried, so that by the time it leaves the machine, it is thoroughly dry.

The electroles are vertical and form the main, effective part of the waterproofing machine. The cathode or negative electrode consists of eight bars of Acheson graphite, one and one-half inches wide and either sixty or seventy-two inches in length. These bars are placed one on top of the other and are properly fastened together so that they form a solid electrode. Each bar carries a shallow trough, which extends across the length of the bar and which feeds a solution of acetate of alumina to the cloth, as it passes between the anode and cathode. The two are pressed together tightly so that the cloth is under some pressure while it is being electrolyzed. In the bottom of the trough there are a series of perforations, through which the solution trickles and comes in contact with the fabric. Each bar of graphite is carried on a spring device, so that the pressure exerted against the cloth, passing between the anode and cathode, can be regulated at will to suit the thickness of the fabric. This arrangement makes it possible to waterproof any kind of material in the machine, irrespective of its thickness or other properties, and it also enables the seams in the fabrics to pass between the electrodes without the necessity of stopping the machine.

The anode or negative electrode is made of a number of aluminum bars, which are arranged one on top of the other. These bars are one inch thick and eighteen inches wide and are of the same length as the cathode. The bars are bolted together in a suitable frame and the whole electrode is covered with a heavy, woolen pad. This pad is an essential part of the waterproofing machine and ensure the uniform distribution of the waterprpoofing solutions over the surface of the cloth. Before the machine is started operating, the pad is thoroughly wetted down.

(*Concluded on page* 437.)

The Manufacture and Coloring of Box Board

Advantages of Box Board as a Container Material—Raw Material—Equipment—Machinery—Labor—Operation—Cheap Dyestuffs Required—Obtaining Uniformity

By ARTHUR T. BRAINERD

H. A. Metz & Co., Chicago, Ill.

BOX board, including paper board and strawboard, is an American development and a comparatively recent one, the industry having had its beginning in the first half of the nineteenth century with the invention of the cylinder paper-making machine.

Paper board is a product made up of several layers or sheets of various kinds of paper stock, from which are made so-called solid fiber containers. Corrugated shipping cases are usually made of a corrugated strawboard with a paper board liner. The term liner as concerns box board designates the outside or face of the board and consequently the liner is usually specially treated, colored and waterproofed. Paper board, as such, is the modernized, machine made "pasteboard" of former years, but only with the advent of the multiple cylinder machine did the product assume any large degree of usefulness. To-day container board is used in the manufacture of boxes of every description for shipping practically every article of commerce.

Advantages of Box Board

The advantages of box board as container material are many. Standard size boxes are made to order in large quantities by the box makers and shipped flat to the customer. It is then possible for large shippers to buy in quantities, ready-made boxes in correct sizes without the necessity of having enormous storage space. Much time is saved in shipping merchandise as box making is eliminated. Smaller packages can be used as units, facilitating handling and giving opportunity for taking advantage of parcel post rates when desirable. Advertising matter can be attractively printed on paper boxes, and thus a valuable medium procured at practically no extra cost. This is a factor of considerable importance with manufacturers of nationally advertised goods having country-wide distribution.

The saving in weight of shipments is also of much importance. At a lecture on box board manufacture which the writer recently had occasion to attend this point was brought out in an interesting manner. It was stated that a specially made fiberboard box for shipping a typewriter weighed only five pounds. The usual wooden container weighs twenty-five pounds. As typewriters are usually shipped by express this difference in weight represents a saving of two to three dollars in transportation charges on each machine in a transcontinental shipment.

United States Government statistics show that by September, 1920, the average production and sale of paper board had reached the total of 9,000 tons per day, or at the rate of 300,000,000 tons a year. The manufacture of paper board is now the largest branch of the paper industry, more than one-third of the capital invested, tonnage produced and value of product sold being credited to this branch of the industry.

Raw Material, Equipment, Machinery, Labor

The principal raw material used in box board is waste paper. News, scrap of all kinds, and used paper boxes become just as truly a raw material in this industry as is wool or cotton in a textile mill. Kraft (unbleached wood pulp) is added in the proportion necessary to produce strength. Unlike most manufactured articles, paper board is not produced by a homogeneous mixture or combination of its different ingredients. The board being made up of layers of different sheets, it has been found advantageous to make these sheets of various kinds of stock. By that method paper can be made to meet various requirements by substituting or adding sheets made of suitable stock. As many different kinds of stock can be used and layers formed as there are cylinders on the machine. Thus the manufacturer plans his finished product to meet requirements of weight, thickness, strength, cost, etc.

Equipment.—The equipment necessary for the manufacture of paper board is heavy and expensive. A large amount of power is consumed in driving the high-speed beaters, Jordan engine, pumps, Fourdrinier machine, and driers. On account of machine room and storage capacity for stock and finished goods a big specially built plant must be available. Tremendous quantities of pure, clear water must be available, necessitating a filtration plant and huge tanking facilities. Soft water is preferable, though not necessary. It has been determined that less rosin and alum can be used to produce equal results if water is reasonably soft. On account of the cost of softening plants, however, they are not generally used,

and it is considered sufficient to remove, by precipitation and filtration, all temporary hardness and suspended organic matter.

Machinery.—In consequence of machinery requirements a large amount of money must be tied up in fixed assets. Considerable working capital is necessary also, because of the necessity of buying stock in large quantities in an advantageous market. The paper mill capacity is twenty-four hours per day, so frequently it becomes advisable to hold a considerable quantity of finished goods on hand, if the selling market for board is dull. A railroad siding should be at hand as shipments are nearly always in car lots.

Labor.—The direct labor expense is comparatively small as a mill can produce about one and one-half to two tons per day per man. Supperintendence and engineering are larger cost items than in many other industries. These are offset somewhat by twenty-four hour production. The cost of manufacture of plain chip board will run approximately $16 per ton, whereas the raw material (waste paper only) now costs the mill in the neighborhood of twice that figure. Material for liner is, of course, considerably higher, as it is necessary to add a certain amount of more expensive wood pulp, together with coloring matter, special sizing, etc.

Operation

Waste paper, purchased from paper stock dealers in bales, need not ordinarily be sorted. Some paper stocks being of more value than others, a considerable amount of sorting is done by the dealer and in the course of this handling much of the junk ordinarily found in waste paper is removed. Nevertheless, there is still present a certain amount of sticks, wires, glass, etc., that cannot be allowed to pass along with the stock.

Cheap Dyestuffs Required

The bales are opened and the material thrown into the first beater. Here by soaking in hot water and beating by revolving paddles the stock is broken up into a fibrous mass. The first beater is known as the continuous beater. This term is derived from the working process, which allows stock to be continuously added to the beater while the wet-out mass is also being removed. This is accomplished by means of a revolving drum set with its hollow axis horizontal and just below the level of the top of the beater. The surface of the drum is covered with slats, near enough together so that only finely mashed pulp can enter. Most foreign material is thereby excluded. The pulp is then piped to the second beater, which, according to size, contains from one to two thousand pounds of material. Here the additional stock is added if desired and the pulp run for one and one-half to two hours for further mixing and breaking. In this beater the color and size are added.

Paper board is usually dyed with the cheapest available dyestuff which will produce the shade desired, or any shade that will be salable. Bismarck Brown and Chrysoidine are used for most of the light tan colored boxes, and Victoria Yellow for the yellow boxes. Some board manufacturers, especially those who operate their own box factories, have recently started producing brighter shades to make their boxes distinctive, at the same time using dyestuffs of better fastness to light. The fastness requirements are not exacting. A box need only hold its appearance for one trip, as it is rarely used a second time. Fading while in storage must be considered, however, so that the original fresh appearance will be retained until the box has served its purpose. Another consideration is color as a background for printing ink. Much rather elaborate printed matter is used on shipping cases, and its effect is largely lost without some brilliancy and permanency of background. Other special requirements may have to be considered. For instance, a soap manufacturer will want a box colored reasonably fast to alkali. The acid colors will answer for almost any purpose where greater permanency is desired.

The necessary dyestuff is dissolved or sprinkled dry into the beater as the stock is running. After the color is thoroughly mixed into the mass about eighty pounds of alum to each 1,000 pounds of pulp is added. This "sets" the color. Temperature and time control are necessary to obtain full color value and reasonable uniformity. If color samples are desired a handful of the pulp can be taken from this beater and distributed on one of the cylinders of the paper machine. As this runs through and is dried, the shade to be obtained from the lot now in the beater is determined. While stock is running in the second beater the size is added. Sizing in the ordinary writing paper is a surfacing operation but in board liner the sizing is penetrated into the fiber, as this method is simpler and at the same time gives sufficient surface sizing to prevent blurring of inks. Moreover, a penetrated sizing produces a more waterproof material and this is the chief object as regards board liner. Rosin is the sizing material used. It is dissolved in soda ash, in such proportion that a slight amount of free rosin remains in the mixture. This is added to the beater and in combination with the alum precipitates upon the fiber. The sizing adds stiffness, "rattle" and strength as well as waterproofing and surfacing.

Obtaining Uniformity

From the second beater the pulp is dropped into a large chest. Thousands of pounds of beat up pulp are always in this chest during a continuous run. Thus uniformity of product and color is obtained. As the liner is the only sheet colored, other equipment is in operation, producing at the same time the uncolored pulp which is to form the remainder of the board. From the chest the material is run into the Jordan engines. These machines,

running at terrific speed, grind the pulp literally into fibers. Any foreign matter remaining is removed by screening before the pulp is sent to the Jordans. The passage through the engine is continuous and rapid; four Jordans will handle 140 tons of pulp per twenty-four hour day.

The paper pulp is now ready to be made into a sheet of paper. It is again screened, through sixty-mesh wire, diluted with a great amount of water, and run into boxes in which are set the cylinders of the Fourdrinier machines. The liquid mass is kept homogeneous and at a stationary level by a partition arrangement at the entrance to the box. The surface of the cylinder is perforated so that as it revolves it picks up the paper fibers. As the covered surface of the cylinder emerges from the diluted pulp "solution," it comes in contact with the felt which runs over and in the same direction as the cylinder. The pulp adheres to the felt and is carried along to the driers, picking up layers from other cylinders en route until when it reaches the drier the sheet of paper is formed. Showers playing on the cylinder remove all bits of fiber which the felt did not pick up. The cylinder surface is thus kept clean and the sheet uniform. The drier consists of a great number of cans, similar to but usually much larger than the drying cans seen in a cotton finishing plant. The paper passes the length of the cans in its full width and is usually split and *trimmed* to width as it is taken off, several rolls thus being made simultaneously. Samples are taken from the rolls about every hour, measured for thickness, compared with standard shade and given a Mullen test for breaking strength. The liner sheet for solid fiber board must stand eighty-five pounds per square inch, and usually runs from 100 to 110 pounds. If any falling off in strength is noted, a correction in stock at the second beater must be made. If the shade is changing it is probably due to variation in stock. This also must be corrected at the beater by necessary changes in dyestuff additions.

A considerable amount of paper is kept in stock on rolls until, as needed, it is made into board by pasting the desired number of layers together with silicate. The board is then sent to the box factory where automatic machines stamp out and print folding boxes of every description.

The Dyeing of Wool Silk

Reasons for High Temperature—Dyes with Selective Affinity—Acidity and Basicity—The Dyeing—Manipulation—Use of Acid Colors When Silk Predominates—Leaving Wool White

By GEORGE EMMONS

THE fact that both wool and silk are animal fibers means that they are similar in their constitution and so may be expected to behave more or less alike with respect to dyestuffs. This is, however, only a broad way of putting the facts of the case. It is valuable as governing the principal features of the dyeing operation. But we cannot stop with the broad generalization and proceed, in sole dependence upon it, to dye fabrics made by interweaving the yarns of wool and silk.

There is another good principle to the effect that a dyestuff that will dye the wool will also dye the silk. This is a valuable guide in the dyeing of mixed fabrics, but we can probably interpret it too rigidly and in consequence run up against some failures. However, the general principle is very valuable. We choose a dye, in consequence, that will do the work for the wool and expect this dye to do well with the silk.

In respect to temperature, it may be said that in general the temperature range between 60 and 80 deg. Cent. (140 and 176 deg. Fahr.) is the suitable thing for silk, and that from 90 to 100 deg. Cent. (194 to 212 deg. Fahr.) is right for wool. The wool may not only require 100 deg. Cent., which is the boiling temperature, but it may demand a prolonged maintenance of the boiling.

Reasons for High Temperature

Why should wool call for such high temperature? This may perhaps be best understood by reflecting that the main constituent of wool is a substance known as keratin. We have examples of it all around us. Hair, fingernails, hoofs, horns, etc., are similar in constitution to wool, and consist largely of this substance keratin. Now, we know that nitrogen is a very inert substance. It exists alongside of oxygen in the atmosphere without entering into combination. So we are not perhaps to be surprised to learn that keratin, which is a nitrogenous body, is rather inert in a dye bath, exercising but little attraction upon the dye. That is, this is the rule for ordinary atmospheric temperatures. It seems necessary that keratin become softened before it starts in actively to attract the dyestuff. All this will serve to explain why it is that wool demands such dye bath temperatures as 90 to 100 deg. Cent. When wool is, however, heated to such levels in the dye bath, it acquires a very good affinity for dyes; and, in the case of some dyestuffs, it equals or almost equals silk.

The difference in the behavior of wool and silk due to temperature is perhaps the chief difference between the two fibers. When, however, both wool and silk fibers are simultaneously in one and the same dye bath, we cannot always count on each attracting the dyestuff precisely as would be the case if each fiber were alone. When both attract the dye, it may not result that each fiber will get its half. And it is the simultaneous attractions of the wool and the silk with which we are concerned in dyeing mixtures of these fibers in a single dye bath.

If one fiber attracts more strongly than the other, it will naturally secure the greater proportion of dyestuff and will accordingly be dyed a deeper shade. There are, it appears, a very few cases where the one fiber will succeed in getting all the dyestuff that is ultimately dyed on the fiber, and this will accordingly leave the other fiber white. If the fiber left white is not stained at all, then these particular dyestuffs may become valuable because of this capacity of dyeing simply the one fiber of the mixture. There are, on the other hand, many dyes which are attracted in a nearly equal degree by both fibers. Such dyestuffs are valuable for the production of a single, solid shade on the fabric.

Dyes with Selective Affinity

Examples of dyes that dye the silk and leave the wool white are:

Rhodamine.
New Victoria Blue.

Examples of the reverse selection of fibers are the following, the wool being colored and the silk left white:

Naphthol Yellow S.
Alizarine Saphirol.
Indigo Carmine.
Fast Yellow.
Azo Fuchsine G.

Then there are dyes which, when used on mixtures of silk and wool, will produce different shades. An example of this is:

Orange II.

We may jockey the temperature at times with the purpose of evening up any differences in the dyeing effects upon the two fibers. That is, we utilize the fact that silk is ordinarily dyed best at a temperature distinctly lower than that usually proper for wool. Thus, we may find, after boiling for a while, that the woolen part of the mixed fabric has acquired the shade wanted, but that the silken portion is far short of the required shade. We may at times meet this situation simply by shutting off the heat partially or entirely and then permitting the bath to cool to the temperature suited to the silk but not to the wool.

Sometimes, by prolonged boiling and by removal of the fabric before much cooling takes place, we may confine the dyeing to the wool. It is to be remembered that, when it is desired to leave one fiber white, what we want is complete absence of staining. A stained white fiber may be just as much of a failure as a full coloring, unless we have some process for removing the stain.

Acidity and Basicity

Attention has been called by one authority to the differences of dye behavior with respect to the two fibers when the acidity and basicity of the dyestuffs are taken into account. Thus, a strongly acid dye may be expected to respond more actively to the wool than to the silk. On the other hand, a dyestuff having a more pronounced basicity may be expected to be more responsive to the silk. An example of this is Rhodamine. This dye leaves the wool partially or altogether white. "Those in which the acid and basic groups are more equally balanced will dye both fibers approximately the same." So says Gandswindt.

Attention is to be given to the matter of the proportion in which one of the fibers enters the fabric. The wool and the silk may not be on anything like an equality. Thus, we may have a fabric which is nearly all wool, the silk being used only for fancy threads, small decorative figures, etc. Under such circumstances, we are not to expect that the complications in respect to the struggle between the two fibers to get the dye will result in the same way as would be the case if the fabric were half silk and half wool or more silk than wool.

The Dyeing

In dyeing silk alone, it is quite customary to use a heavy proportion of boiled-off liquor in the dye bath. In the present case, however, where woolen fiber goes into the bath along with the silk, we omit the boiled-off liquor. The reason turns on the bad effects produced on the wool. It is rendered too soft, and this affects the mixed fabric. Glauber salt is another dye bath assistant that is now to be left out of consideration, as far as seems possible, unless the fabric is to be boiled only a short period. It is said to make the silk rough and brittle in case the fabric is boiled a long while.

Soft water is the thing to use when mixed fabrics are being dyed. If the water is not soft, as furnished by nature, then it is to be softened artificially in advance of its use in the dye bath.

The amount of water to use in the bath may be stated as twenty-five to thirty times the weight of the fabric. Thus, if the fabric weighs 100 pounds, there should be 2,500 or 3,000 pounds of water. As the U. S. gallon weighs 8 1/3 pounds and the Imperial British gallon 10

pounds, we may easily convert the required weight of water into the respective gallons. Thus, we are to use from 300 to 360 U. S. gallons or 250 to 300 British gallons for 100 pounds of fabric. Or, we may state the matter thus: Use three or three and one-half U. S. gallons to each pound of fabric or two and one-half to three British gallons.

Manipulation

In general, the appearance of the finished fabric will be improved if the wool is dyed somewhat more deeply than the silk. If no additional dye is to be used for shading purposes, we may generally dye the fabric in a single bath. If shading is to be done, a second bath is to be employed. Basic dyes are useful for this purpose. This is largely due to their brilliance and beauty.

Basic dyestuffs are, it would seem, not much used for the production of the main color. When so used, the bath is to be employed at a temperature around 80 deg. Cent. (176 deg. Fahr.), a temperature very distinctly below the boiling point. The bath is to be neutral or slightly acidulated by the addition of a small amount of acetic acid. Certain basic dyes used in a cold bath, acidified by acetic acid, are attracted especially by the silk. The wool gets but little of the dyestuff. Examples of such basic dyes are Methylene Blue, Brilliant Green and Safranine.

The group of dyestuffs depended upon generally in the dyeing of mixtures of wool and silk is that known as the acid dyes. Fortunately, most of these dyestuffs seem to have pretty much the same affinity for wool as for silk.

Assume now that the fabric consists for the most part of wool. We shall want some Glauber salt, but restrict the amount, using, say, from 5 to 10 per cent. The Glauber salt calls for sulphuric acid as an accompaniment. We use from 1½ to 3 per cent. The bath is given a temperature of 90 deg. (194 deg. Fahr.), which is distinct from the boiling temperature, but the difference is not great. If the temperature be set lower and the acid increased in amount, the silk will have an advantage over the wool in attracting the dye. But, if the temperature be pushed up, especially if it is raised all the way to the boiling point, then the wool will have the advantage. Alkaline Blue calls for a special word. This dyestuff is to be used in a bath having a temperature of 80 to 90 deg. Cent. (176 to 194 deg. Fahr.), and containing 10 per cent of borax. After dyeing, the fabric is washed and then treated in a bath containing water and a little acid.

Use of Acid Colors When Silk Predominates

If the fabric is silk for the greater part, the acid dyes are used somewhat differently from the procedure outlined for fabrics containing a predominant proportion of wool. That is to say, the Glauber salt may be left out to advantage. The sulphuric acid is, however, retained. Or, according to Steinbeck, we use a bath, "with an addition of ten parts of sulphate of magnesia per 1,000 parts of bath liquor."

When it is a question of such dyes as the following, we may, with advantage, carry out a preliminary procedure:

Nigrosine.
Induline.

These dyestuffs are to be regarded as representing the class which are attracted more to silk than to wool. Under the condition that one of these dyes is going to be used and that the bath is not required to be strongly acid nor to be of an alkaline character, we put from 2 to 4 per cent of cream of tartar into the bath prior to the addition of the dyestuff. The fabric is entered and the whole brought to the boil. The cream of tartar is assumed to be completely absorbed by the wool. The bath is then permitted to cool off, when a double quantity of sodium phosphate is put in. This substance will, it is understood, be almost completely taken up by the silk. The dyeing may then proceed.

Such dyestuffs as those mentioned—Nigrosine and Induline—that is, dyestuffs that are attracted more by the silk than by the wool, may be advantageously used in accordance with the method described. It will perhaps be desirable to make an addition of ammonium acetate to the dye bath.

As already noted, it is desirable, in general, to dye the wool more deeply than the silk. It is a matter of appearance. When this result is wanted, we may expect to manage it by controlling the temperature. Or we may add more acid to the dye bath. However, we should be on our guard against putting too much acid into the dye liquor. If the shades are to be light ones, then high acidity is to be avoided.

Leaving Wool White

If it is desired to dye the fabric in such way as to leave the wool white, the general procedure is quite simple. That is to say, we simply use a cold dye bath. The acid dyes have, in general, the property of dyeing silk in such a bath. On the other hand, if what is wanted is to dye the wool and leave the cotton colored a lighter shade, then the dye bath is to be boiled for a period. By managing the dyeing through the temperature, we may get a considerable variety of results. Moreover, we have a means of correction, if the silk does not get enough color. We may finish with a topping operation, using a basic dye to carry out this topping treatment. We first get the acid dye bath exhausted and then allow it to cool down to 70 to 80 deg. Cent. (158 to 176 deg. Fahr.). The basic dye may then be added to the exhausted bath. The goods are treated for, say, fifteen minutes without continuing the application of heat to the dye bath. It is permitted to cool naturally while the topping operation goes on.

The basic dye is, of course, not to be added in the dry state to the bath, but in the form of a solution.

The authority Gandswindt recommends in consequence of the different absorptive capacities of the two fibers at different temperatures that the dye be not all added to the bath at one stroke. First, let the wool be dyed to shade or pattern with part of the dye. The liquor is boiled or kept near the boiling point. Afterwards, the bath is permitted to cool down somewhat. The silk is now dyed. There may or may not be enough dye in the bath for this purpose. If more dye is needed, it is put in. The art of using acid dyes in dyeing wool-silk fabrics consists largely in managing the temperature of the acid bath and in properly proportioning the dye baths and in attending to the right addition of acid.

When it is desired to dye goods that consist principally of wool, but nevertheless have silk-effect threads, we may advantageously use Acid Chrome dyes. Low acidity and high temperature are controlling factors in securing the threads clear and white. A high degree of fastness will often be required. A suitable process is to use Acid Chrome colors which may be applied in the same bath with the chrome.

The Two-Bath Method

However, it seems probable that the very best effects relative to the whiteness of the silk are to be gotten by the two-bath method. The fabric is first given the chroming treatment and the dyestuff then applied in a separate bath. Thus the fabric is treated in a chrome bath containing from 2 to 3 per cent of chrome, the percentage being based on the weight of the work. In this same bath is dissolved from 2 to 3 per cent of tartar. Or, the bath may be prepared with from 1 to 2 per cent of chrome and from 1 to 3 per cent of formic acid.

After the chrome treatment by either recipe, the goods are to be rinsed and then dyed in a separate bath. In this bath, in addition to the dye, we put from 2 to 5 per cent of acetic acid or 5 per cent of ammonium acetate in case light shades are in contemplation. The bath is made tepid for the start. After the fabric has been entered, the bath is raised to the boiling point and boiling is continued for two hours. If the shade in contemplation is a heavy one, the procedure is the same until the boiling has continued for the space of one hour. At this juncture from 2 to 4 per cent of acetic acid is added, the purpose being to effect the exhaustion of the bath. When the fabric has been duly dyed and then rinsed, it is to be given a treatment in a bath containing acetic or formic acid.

The difficulty of keeping the silk threads unstained is, as might be supposed, greatest when heavy shades, especially black, are being applied. Consequently, even with good attention the fabric may come out with the threads somewhat stained. In this case we may proceed as follows: A new bath is prepared containing only water and ammonium oxalate. One ounce of the oxalate to 100 gallons of water will be about right. This bath is heated to 175 deg. Fahr. and the treatment is continued for twenty minutes. Afterward the fabric is rinsed.

A still more effective method, perhaps, is one which contains 2 ounces of ammonium acetate per 10 gallons of water. However, this method is so effective that some of the dye on the wool may be stripped off. This loss may be allowed for at the start by dyeing a heavier shade.—Silk.

A STANDARD METHOD FOR THE ESTIMATION OF SOAP IN WOOL

The sample is first extracted with freshly distilled petroleum ether to remove oil, which is then examined for the presence of soap by boiling in distilled water and titrating with sulphuric acid. The material is next placed in a Soxhlet extractor of 200 c.c. capacity and extracted with redistilled, neutral, absolute alcohol. All operations are conducted in glass vessels provided with ground-in joints, and the extractor is covered with asbestos paper in order to maintain the temperature of the alcohol and wool at or near the boiling point. The duration of the extraction is about five to six hours, the extractor being filled and emptied twelve times. In one case twelve extractions gave 1.14 per cent total extract, and a further twelve extractions gave only an additional 0.014 per cent extract. The hot liquid is filtered through suitable filter paper, and the bulk of the alcohol distilled off, leaving about 50 c.c. This is poured into a wide-mouthed flask of 100 c.c. capacity, and the distilling flask is washed out into the same. The alcohol is then evaporated on a water bath, the residue dried in a steam oven, cooled in a desiccator under reduced pressure, and weighed. The total extract thus obtained is boiled with 60 c.c. of distilled water containing a little Methyl Orange or Methyl Red. A known excess of N/10 sulphuric acid is then introduced, the whole boiled, allowed to cool, and shaken up three times with neutral ether obtained by distillation over lime. The ether is washed with water and the washings added to the liquor. On evaporation, the ether residue gives the total oil and fatty acid in the alcoholic extract. Fatty acid is determined in the oil obtained by dissolving it in absolute alcohol and titrating with N/10 potassium hydroxide, and the difference between added acid and the back titration figure is calculated to sodium oleate. Calcium soaps are included as sodium oleate, but may lie separately determined as follows: The liquor after back titration for soap, is evaporated to dryness, washed with a little ether, and dissolved in water. Ammonia, ammonium chloride, and ammonium oxalate are added, and the whole allowed to stand for several hours. The precipitate is filtered, washed and dissolved in warm 2 per cent sulphuric acid, then titrated while hot with N/10 potassium permanganate. One

series of extractions gave 0.09 per cent of calcium soap.

If a persistent emulsion forms when shaking the liquor with ether, it is advisable to separate as much of the latter as possible, evaporate the acid liquor to dryness, and wash the residue with ether to remove fatty acid or oil. The fatty matter in such emulsions sometimes amounts to 0.03 per cent of the weight of the cloth.—Contribution from the British Research Association for the Woolen and Worsted Industries, through the J. Tex. Inst.

The Application of Color to Leather

Difficulties Met With in This Field—Tray Dyeing—Trough Dyeing—Paddle Dyeing—Drums—Staining—Vegetable Tanned Leathers—Dyeing of Chrome Tanned Leathers—Alum Tannage—Oil Tannage—Aldehyde Leathers—Combination Tannages—Fastness Properties of Dyed Leathers

By T. E. BRADBURY

A paper read before the London Section, Society of Dyers and Colourists, and published in the Journal of the Society

FOR the successful application of leather in the clothing, upholstery, bookbinding, and fancy trades the dyer is largely responsible, but on the other hand the discredit into which leather for bookbinding and upholstery purposes had fallen a few years ago was largely due to the careless work of the dyers of preceding years. In order to produce bright or heavy shades sulphuric acid was used, sometimes in excessive amounts, and this rapidly deteriorated the leather.

Acetic, lactic, tartaric and oxalic acids were therefore tried, but the latter was injurious in its action on leather fiber, while the others were too weak to develop full shades with acid dyestuffs. Fortunately about 1903 formic acid was manufactured commercially, and was found to be sufficiently strong to develop the color of acid dyestuffs, and yet to have no injurious action on leather. [See *Report of The Society of Arts on Leather for Bookbinding*, and paper by M. C. and J. W. Lamb, J.S.D.C., August, 1907.]

Compared with cotton, wool or silk dyeing, leather dyeing presents numerous difficulties. There are enormous variations in different skins, and even in various portions of the same skin, as regards their affinity for dyestuffs; and although by suitable choice of dyestuffs these differences are rendered less conspicuous, it is nevertheless impossible to eliminate them altogether. The causes of these differences are many. In a pack of goods to be dyed there may be skins of animals of differing age, from animals fed in varying ways, and killed at different times of the year; all of which affect their affinity for dyestuffs. In addition to this, the processes of liming, puering and tanning all influence the resulting color. Some of these differences may be eliminated by a careful sorting.

In view of the fact that portions of the same skin may vary in affinity for color, when making comparative tests of dyestuffs, only portions of a skin which are adjacent should be used when comparing the dyeing properties of different dyestuffs.

Another difficulty met with in the dyeing of leather is in the calculation of the amount of dyestuffs required. The skins may vary in thickness and, since the amount of dyestuff necessary to produce a certain shade depends largely upon the area to be covered, the thicker the skins the less percentage of dyestuff is required. The following example from works practice will illustrate this. In the dyeing of a parcel of four dozen stout Cape goat for Levant morocco, in a red shade, 24 ounces of dyestuff was used. For the same shade a parcel of skins equal in area but shaved to a thinner substance for fine grain required 22 ounces color. These quantities represented 1.6 per cent dyestuff for the stouter goods and 2.9 per cent for the thinner goods when calculated on dry weights; a difference of about 85 per cent color. The goods may also be received in either a dry, damp, or wet state, which makes the question of calculations more complicated.

The dyeing of leather is usually conducted in either the tray (by hand), the paddle, the drum or tumbler, or by brushing (staining).

Tray Dyeing

Owing to the high costs of labor in recent years, the use of the tray has been largely discontinued in favor of mechanical devices for agitating the skins. The tray is usually a wooden box about four and one-half feet long by three feet wide and one foot deep. This is filled with water at the temperature necessary for dyeing, and the pack of two or three dozen skins, previously paired with flesh sides together, is entered. Two youths, one on either side of the tray, systematically take the bottom pair of

skins and transfer them to the top. In this way the goods are kept slowly moving, and may be dyed quite evenly if sufficient care is exercised. Owing to the time required to turn the pack, the solution of dyestuff must be added in small quantities.

In tray dyeing the skins are only dyed on one side, and a certain economy of dyestuff results. If some skins in a pack take up the color more slowly than the rest, they may be retained a little longer in the dye liquor. Another advantage is that tender skins, or those which have an easily injured grain, are less likely to be damaged; the goods are more under observation than in any other method of dyeing; and lastly, small parcels of skins may be conveniently handled.

Against these minor advantages one must place the high cost of labor and the comparatively small packs of skins (from two to three dozen) that can be dyed at once by the tray method. This often means that a parcel of twenty dozen skins may show several distinct shades due to different dyeings.

Trough Dyeing

This is the Continental method of hand dyeing. The trays are smaller than ours, and hold very little liquor. The skins are dyed only two at a time, in pairs, and use is made of a series of three troughs. No. 1 has a weak dye liquor, No. 2 is somewhat stronger, while No. 3 is still more concentrated. A pair of skins go through troughs 1, 2, and 3 in rotation. Then the exhausted liquor in No. 1 is thrown out, and a fresh No. 3 takes its place. This method is more economical in dyestuff than our English system, but even with dyestuffs at high prices the method is too costly in labor to be used here.

Paddle Dyeing

The receptable for the dye liquor and skins in paddle dyeing consists of a bath, usually half cylindrical in shape, across the top of which is placed a paddle wheel with four or six wide blades. As it revolves this wheel dips into the dye bath, causing the liquor to circulate and carry with it the skins. To a certain limit, beyond which it is unwise to go, the more skins there are in the bath the better is the circulation, and the less likelihood there is of uneven dyeing. It is possible with a paddle of about 200 gallons capacity to dye in one operation twenty or twenty-five dozen skins of an average size of five square feet each.

In this method of dyeing both sides of the skins are colored, and the amount of dyestuff required is therefore more than in tray dyeing. The penetration of color, though much less than in drum dyeing, is greater than with the tray method. All skins have the same treatment, and it is not possible to sort out those skins that might benefit by extra time during dyeing, as in tray work. The heat of the liquor should be retained by the use of covers.

The advantages of paddle dyeing are: (1) The enormous saving of labor (as against tray work); (2) the large number of skins (up to, say, twenty-five dozen) that may be dyed at once; (3) the less violent action on the skin than is given in the drum; (4) the amount of dyestuff used is appreciably less than required in drum dyeing.

Drums

These, the commonest leather dyeing machines, are short cylinders of timber, in shape very much like the bass drum of an orchestra. They are fixed inside with six shelves or sets of pegs spaced equidistant round the inner periphery. As the drums rotate these lift the skins a certain distance and then drop them into the liquor. The usual speed is about fourteen revolutions per minute, and the treatment received by the skins is pretty severe. The door may be placed either in the head of a drum or on the circumference, but a light door, with bar and wedge fastener on the circumference, is the most satisfactory. There is a hollow bearing or trunnion through which can be made additions of dyestuff solution, etc., or water passed through for washing purposes, and it is a decided advantage to have some means of removing the liquors from the drum while in motion, such as a lattice door; as skins may then be prepared, dyed, and fat-liquored without much handling. In addition to round drums, hexagonal and box-shaped tumblers are largely used. The latter shape is preferred by dressers of glove leathers. In this the trunnions are fixed on diagonally opposite corners, and the skins not only get a tumbling, but a squeezing action as well. The hexagonal tumblers also give the leather a very vigorous treatment, and are especially useful when dealing with skins that are more than ordinarily dirty. The advantages of drum dyeing include good penetration, saving of labor, and large output.

Staining

The fourth method of dyeing skins, viz., brush staining, is used chiefly for heavy hides and kips or when the flesh side of skins is required to be undyed. The hides are laid out on flat tables, and a solution of dyestuff, or mordant, is quickly brushed over the the surface, using a moderately soft brush. It is better to give two or more coats of a weaker dye solution than to rely on a more concentrated liquor giving the shade required with only one coat. When there is much damaged grain in the leather the application of a coat of weak Irish moss or gelatine solution before brushing on the stain will give improved results.

Vegetable Tanned Leathers

The vegetable tannages, and also the new synthetic tans, such as Paradol and Syntan, are used for almost

every purpose where particular resistance to water or heat is not specially desired. The skin of the ox, calf, sheep, pig, goat, seal, alligator and many others is tanned by this method. Practically all of the leather for the bag and fancy trades, bookbinding and upholstery work is vegetable tanned, because of the superiority in graining and finish that can thus be obtained. In the shoe trades also a large proportion of the leather used is vegetable tanned.

Many failures to produce a salable article are due to want of good preparation. The presence of a certain amount of fat is essential for the making of good leather, but it is better to entirely remove the fat already in the skin (if necessary by volatile solvents) and later to incorporate a little oil throughout the whole skin than to attempt to work with skins that contain any noticeable amount of fat.

As degreasing by volatile solvents necessitates the use of a costly plant, most dyers have to do their own cleansing in another way. If the skins are fairly free from grease, drumming (or paddling for thinner skins) for an hour or two in warm water, to which is added about 2 pounds sumac for each dozen skins, usually suffices to bring the goods into a suitable condition for dyeing. They should then be rinsed and "struck out." This latter operation consists in stretching out the skin and thus opening up the crevices of the grain to the action of the dye liquor. It may be performed by hand with a brass slicker, or more commonly by the modern rubber roll machine.

When dealing with more greasy skins, such as seals, East India kips, goat or sheep, Niger goat or sheep, and some basils, it is advisable to give the skins a treatment such as the following: First drum for twenty minutes in warm water at about 35 deg. Cent. Then add 1 to 1¼ per cent of borax (calculated on the dry weight of the leather) and work for a further twenty minutes; rinse in fresh warm water for ten minutes; run off and work ten minutes in warm water to which has been added sufficient formic acid to neutralize any alkali remaining in the skins. Then treat with sumac for an hour or two as before mentioned. For very greasy skins, carbonate of soda may be substituted for borax.

In some cases the treatment with borax or soda is given by brushing the solutions on the grain side of the leather. Although the surface grease may be removed in this way, the skins on drying in a warm stove "throw up" more grease.

When dealing with skins tanned with a large proportion of synthetic tans of the Neradol series, treatment with alkalis is apt to strip a good deal of the tannage. In such cases degreasing by volatile solvents is to be preferred.

In practice skins are often stained by particles of iron from the grinding of the shaving or splitting knives, or from other causes. If such skins are to be dyed in pale shades, it is customary to clear them by working for a few minutes in a cold bath of about 1 pound sulphuric acid in 10 or 15 gallons of water. This operation not only removes iron stains but also brightens the color of the leather. The skins are then thoroughly washed with water to remove as much of the acid as possible, and sumached. It is possible to remove all traces of acid, and such soured goods should never be sold for bookbinding or upholstery work. A much more satisfactory plan is to omit the souring and sort the skins, using the stained ones for the darker colors.

Many varieties of native-tanned leathers which are imported into this country, such as Smyrna and Bagdad sheep, Nigerian goat and sheep, are much undertanned and the treatment with sumac may with advantage be prolonged for two or three days. Synthetic tans also are useful in retanning such stock.

The limit of temperature for dyeing vegetable tanned leather is about 50 deg. Cent., but when a pack of goods is entered in to a dye liquor the temperature may be a little above this figure, as the skins soon reduce the temperature sufficiently.

The two chief classes of dyestuffs for vegetable tanned leathers are the acid and the basic colors. The former are best dyed with an addition of formic acid, the prepared skins being worked for twenty minutes with about two-thirds of the requisite color. An amount of formic acid, from a half to an equal weight of the dyestuff employed, is then added, and after a further ten minutes' working, the remainder of the color. Another half hour is usually sufficient to complete the dyeing. No addition of Glauber salt is necessary, but when penetration is particularly desired, for example, in suede or velvet leathers, ammonium acetate is a useful addition to the dye bath. In this case the goods are drummed with the color, and about 5 per cent ammonium acetate calculated on the dry weight of the leather for one hour before adding the acid.

Sulphuric acid may be substituted for formic acid where the demands for durability are not exacting. Usually less than half the weight of dyestuff in sulphuric acid is sufficient; 3 per cent on the dry weight of the leather should, however, never be exceeded, even though heavy shades require 12 or 15 per cent of dyestuff.

In the dyeing of pale shades, such as grays and fawns, with acid colors, the addition to the dye bath of about 10 per cent ground sumac on the dry weight of the leather assists in keeping weak grain and flesh side lighter in color. This prevents a good deal of unsightly "marking off" at the edges of the skins, of color from the flesh side onto the grain side, when a pack lies in pile waiting to be struck out after dyeing.

Basic colors may be applied to vegetable tanned leather without previous mordanting. Somewhat faster and fuller shades are obtained if the leather is treated with fixing agents for the loose tan, such as

tartar emetic or "Titox" (potassium titanium oxalate) before dyeing. Acetic acid as an addition to the dye liquor assists in securing level dyeing and in preventing bronziness. If bronziness develops, the application of a milk and water seasoning after drying removes it. As a general rule, basic colors do not penetrate so readily or dye so easily as acid colors. They are, however, capable of giving heavier shades, and for this reason are often used for topping acid colors. Heavy shades of nigger and black on suedes are usually produced with basic colors.

Some metallic salt, such as ferrous sulphate, titox, bichromate of potash or copper sulphate, is frequently used with basic dyestuffs as saddening agent or for bottoming purposes. They not only combine with tannins to produce colored compounds, but give somewhat faster shades. Ferrous sulphate and other iron salts give a gray, and titox an orange brown. Ferrous sulphate, copper sulphate and potassium bichromate should be used sparingly, owing to their tendering action on leather. With iron grays the color penetrates readily, and may be shaded by additions of orange, etc., but sulphuric acid must not be employed with the dyestuff, or the iron gray will not be developed. The orange brown given by titox makes a useful bottom for other shades; it is reasonably cheap, but has the disadvantage of being almost impossible to strip.

The direct colors are used to a limited extent on vegetable tanned leathers. They usually penetrate well and dye evenly; but the depth of shade obtained is not great. Light mode shades may often be satisfactorily dyed with direct colors. With some dyes, such as Chlorazol Fast Brown RK and Chlorazol Fast Red K, formic acid may be used with advantage.

The chief natural dyestuff of value for vegetable tanned leather is Logwood. Orchil, Fustic, Brazilwood and Cochineal are also used to a slight extent. Logwood is generally used along with iron salts, and Old Fustic is occasionally added to get the desired tone of black. Except when applied by the brushing-on method it is impossible to get a full black with Logwood on vegetable tanned leather, and in other cases such a color as Nigrosine is added in finishing.

The Dyeing of Chrome Tanned Leathers

These goods reach the dyer in a wet state, and calculations are usually made on what is known as either "wet weight" or "shaved weight." In the latter case the skins have been shaved to reduce or level the thickness, and the amount of water left in them is practically equal to that which would remain if the skins were well struck out with a slicker, averaging about two and one-quarter times the dry weight. The reason why chrome leather is delivered to the dyer in a wet state is the extreme difficulty of wetting the dried skins. M. C. Lamb has suggested the use of a fat liquor containing castor or neatsfoot oil, with egg yolk, glucose and algin, in which the skins are treated after tanning and then dried out. Skins treated in this way may be stored in a dry state until needed for dyeing, when they easily wet out with warm water, but the trouble more than counteracts the advantages gained.

Fresh chrome tanned skins are always in an acid conditions as they come out of the tan liquor, and must be carefully neutralized before dyeing, as free acid in the skins may not only cause uneven dyeing but also splits up the fat liquor subsequently employed and tends to rot the leather. The most satisfactory neutralizing agent is borax, and 1 to 3 per cent, calculated on "shaved weight," is usually sufficient. A wash in warm water for ten minutes should precede the treatment with borax. After drumming for twenty minutes or so in the borax, the liquor should show no acid reaction to blue litmus paper. After neutralizing, it is advisable to wash for a while in warm water before dyeing. Well-tanned chrome leathers are unaffected by immersion for a few minutes in boiling water. It is advisable, however, to conduct the dyeing and fat liquor operations at about 140 deg. Fahr. (60 deg. Cent.). The drum is the only machine in which the dyeing and fat liquoring can be satisfactorily carried out.

The colors used in dyeing chrome leather must be reasonably fast to washing, as fat liquoring is a most essential operation. This consists in treating the skins with a hot emulsion of castor or neatsfoot oil combined with soap or sulphonated oil, and particularly when soaps are employed the stripping action on the color is likely to be pronounced. This may be prevented by fat liquoring previous to dyeing, but the results are not usually satisfactory. Without the use of a fat liquor chrome leather is comparatively useless, drying out hard and unbendable.

Chrome leather may be dyed with either acid, direct or mordant colors without mordanting. Basic colors may also be used by previously mordanting with some tannin, such as sumac or gambier. Natural dyestuffs, such as Old Fustic, Brazilwood and Logwood, contain a certain amount of tannin, and may be used as mordants for basic colors. Chrome leather which has been given a light treatment with tannin glazes up much more readily in the finishing process, and, because of this property, the natural dyestuffs or their extracts are much used for the bottoming or mordanting of chrome tanned leathers.

The usual procedure is to drum the neutralized chrome leather for about twenty minutes in 2 to 2½ per cent Gambier, Fustic or other suitable mordant (calculated on shaved weight), and then add the acid or basic color. With larger amounts of tannin the grain of the leather becomes tightened, and the material loses some of the good qualities associated with full chrome leathers.

It is an advantage, particularly when employing basic

colors, to fix the tannin mordant with such salts as titox, which may be added to the exhausted tannin liquor. The particular mordant or tannin which is used depends to a large extent on the shade to be dyed. Fustic gives a good yellow bottom for tans; Peachwood or Brazilwood is useful for reds; Gambier for browns; and Sumac for pale shades, such as champagne or gray. By using Sumac fixed with tartar emetic, a very light ground color is obtained, but titox gives a useful bottom for browns.

To improve the glazing properties, a treatment with tannin is usually resorted to, even when applying acid or direct colors, the natural method being to treat with tannin or dyewood extract before adding the dyestuff, but this results in weaker shades than when the dyeing precedes the use of tannin, this being particularly the case with direct colors. These colors as a rule are eminently suitable for chrome leather, and by the choice of such dyestuffs as are reasonably fast to acids and washing, very full and level shades are obtained which behave satisfactorily in the fat-liquoring process. The aftertreatment with tannin in the exhausted dye liquor overcomes the glazing difficulty. In the United States, where probably 80 per cent of the world's production of black glace kid is manufactured, direct blacks are used almost exclusively, but in England they are much less used at present. By the use of these products, followed by Hematine, very good solid black are obtained which require a minimum of Nigrosine in the finish. If the Hematine is applied first, the black suffers considerably.

In the opinion of the author well-selected direct colors, followed by a light treatment with tannin, are the most satisfactory products for chrome leather dyeing, but the use of such sensitive products as Congo Red be avoided.

A few of the artificial mordant dyes are applicable to chrome leather, but as a rule the shades produced are not very full, as they require a higher temperature for their full development than is permissible in leather work. The colors chiefly used are Anthracene Brown, Anthracene Blue, Alizadine Brown, Gallocyanine, Galleine and Coerulein.

A mixture of Anthracene Brown and Anthracene Blue gives very level gray shades.

In fat liquors, sulphonated oils are now being used in place of soaps, as there is less stripping of the color. Egg yolk acts very well in itself, but is too expensive to be employed alone. It is often added to emulsions of neatsfoot oil, sulphonated oil, or soap. Usually from 3 to 5 per cent of a fat liquor containing about three parts oil (neatsfoot, degras, or castor) to one part soap or sulphonated oil is employed on chrome leathers, the time of treatment being thirty to forty-five minutes. The leather must be in a hot condition when the fat liquor is added, and the volume of liquor used must be small, otherwise much color will be stripped off. If the amount of acid used for dyeing is small, and be not a mineral acid, the fat liquor may be added to a portion of the exhaused dye liquor. In this way a saving of labor is effected.

Alum Tannage

The skins usually dressed in this tannage are for gloving and shoe work, and embrace such skins as sheep, kid, gazelle, etc. The great difficulty in successfully dyeing alum leathers is the liability of the tannage or dressing to wash out, even with cold water. After the skins have been dressed with a mixture of alum, salt, flour and egg yolk they are best allowed to age for some weeks before being dyed as the dressing in that way becomes a little more resistant to washing. Alum dressed leathers are difficult to wet out, particularly after aging. They should be drummed in a little lukewarm water until all opaque white spots have disappeared, a small amount of ammonia being added. Some dressers of alum leathers then give the skins a light treatment with chrome alum, which exerts a considerable tanning action.

The natural dyewoods are largely used in dyeing alum-tanned leathers, as their mild tanning action is especially valuable. Used in moderation they do not interfere with the stretching qualities that are characteristic of this dressing. They also fill the leather, giving a good handle and substance. The usual procedure, after wetting out the leather in lukewarm water, is to drum or "full" the skins in a decoction of dyewood or extract for about an hour, then add a suitable metallic salt or "striker" (copperas, titox, or bichromate), and work the skins for twenty to thirty minutes. With some leathers a light redressing with alum, etc., is then given, but in any case it is necessary to re-egg in order to replace some of the dressing that has been washed out during wetting out and dyeing.

The range of natural dyestuffs is often insufficient to produce the shades required, and the use of basic and acid colors must be resorted to. No mordanting is necessary when topping natural dyestuffs. Acid colors are most satisfactory for shades in suede work for gloving leather, and are applied with ammonium acetate and formic acid. Certain acid colors which have the disadvantages of "marking off," such as the Azo Flavines, Indian Yellows, and Citronines should not be used.

A useful combination for browns is Acid Orange G, Cardinal Red J, and Naphthalene Black 12B or similar types. Useful grays are obtained by bottoming with Gambier, using copperas as striker and then topping with Naphthalene Black 12B and Acid Orange G.

When alum leathers are required for suede work they are usually subjected to very severe working on emery wheels in order to produce a fine nap. This removes a good deal of surface color, and for this reason basic colors are not so satisfactory as acid dyestuffs, as they do not penetrate so well.

Oil Tannage

This is used chiefly for gloving purposes, and is applied to flesh splits of sheepskins and deerskins. Ordinarily chamois leather is the splits from sheepskins which

have been oil dressed. When such goods are received by the dyer they usually contain an excess of oil, and possibly some soap left over from the tanning and tucking. This latter operation consists in dipping the previously oil tanned fleshes for a few seconds into a boiling bath of soap and oil (or fat liquor). The skins shrink very considerably, but in so doing gain body and plumpness. The fibers are also rendered more compact and solid. Oil dressed leathers differ from all other leathers in their increased resistance to alkaline treatment, and to remove excess of oil the goods are "tumbled" in a warm solution of soda ash (one pound in ten gallons) or soap for about twenty minutes, and then washed in warm water until the latter runs clear. The affinity for dyestuffs of oil dressed leather is somewhat remarkable, and dyeing may be done with either acid, basic, direct, mordant or sulphide colors. Of these the two latter are perhaps the most satisfactory, as the chief use of oil tanned or chamois leather is for the gloving trade. In recent years the demand for washable gloves has increased enormously, and sulphide or mordant colors give the best degree of fastness to washing. They are also the least liable to mark off with perspiration. The shades mostly in demand are grays and browns, and it is advisable to bleach the skins before dyeing light colors. The old method of bleaching by exposure to air and light is still mostly practised. The goods are washed in soap and water, and then spread out on grass fields until the combined action of light, air and moisture has bleached the somewhat full shade of yellow to a reasonable whiteness. The bleaching may take a day or two, or may require a much longer period, according to weather conditions. Dust and smuts that may have settled on the goods should then be washed off before proceeding with the dyeing. Next to grass bleaching the use of hydrogen peroxide is most satisfactory, but is expensive. A bath is made up containing one pound sulphuric acid in ten gallons water, and sodium peroxide sprinkled in (stirring all the while) until the solution is neutral. A small amount of ammonia is then added, and the skins are worked in this solution at a temperature of about 100 deg. Fahr. for half an hour, then allowed to lie in it for a few hours, and worked for a further half-hour at 100 deg. Fahr. After six or eight hours, a satisfactory degree of whiteness is obtained. Other methods of bleaching are stoving with sulphur dioxide, and treatment with permanganate followed by bisulphite.

Sulphide dyes give the utmost fastness to washing, and are employed in the following way: The dyestuff is dissolved in boiling water with the least possible amount of sodium sulphide crystals—usually one and one-half times the weight of color. To this solution is added soap equal to one-fifth the weight of the dyestuff. The solution is then cooled, and one-tenth the weight of the dyestuff of formaldehyde (40 per cent) is added. The use of a neutralized synthetic tan in place of formaldehyde also gives very good results. The leather is worked in this solution for half an hour cold, then washed and treated for twenty minutes in a cold solution containing four and one-half ounces potassium bichromate, three ounces copper sulphate, two pounds acetic acid 50 per cent, and ten gallons water. After a thorough washing the skins are soaped. These colors penetrate well, and are full in shade.

Many of the Thionol colors (B.D.C.), such as Thionol Browns P, B, GD, GRR, Thionol Olive Brown B, and Thionol Blacks SGG, GSX Conc., and the immedial colors (Cassella) give satisfactory results.

Where very heavy shades are required, it is better to top with basic colors than to use a large percentage of sulphide color, and therefore of sulphide. Four pounds sodium sulphide crystals per ten gallons liquor should be regarded as a maximum.

Next to the sulphide colors, the mordant dyestuffs give the best results. These are best applied on a basic chrome alum mordant, which can be prepared by adding a solution of four ounces washing soda to a hot solution of three pounds chrome alum in twenty gallons of water. The skins are treated for half to three-quarters of an hour in the warm solution, and then dyed without much delay and without washing off.

The dyeing takes place at about 108 deg. Fahr. (40 deg. Cent.), and it is advisable to commence with only about half the amount of color. After twenty minutes an addition is made of sodium bisulphate, and later the remainder of the dyestuff is added. The length of time required is about one hour.

With such dyestuffs as Anthracene Brown, Anthracene Blue, Alizadine Brown, Gallocyanine, Coerulein, Gallein and Khaki Yellow penetration is quite good, and the colors are very level.

Natural dyestuffs, such as Logwood, Fustic and Brazilwood, are still much used, Logwood being still prime favorite for blacks. Titanium and iron sales are frequently employed as mordants, or strikers.

Direct colors may be applied to chamois leather, but the shades so produced are not very level, and their fastness to washing is little, if any, better than that of some of the acid and basic colors.

Acid colors dye this leather fairly easily, and where the requirements as to fastness to washing are not exacting their good leveling and penetrating properties offer distinct advantages.

With oil tanned leather the fat liquor used after acid colors should contain little or no soap. Egg yolk is frequently used alone, and if the shade is dyed rather fuller than required the loss of color is compensated for. Formic acid is preferable to sulphuric acid, and if any difficulty is experienced in obtaining penetration ammonium acetate should be employed.

Basic colors may be applied to chamois without any previous mordant, but aluminum acetate is sometimes used. With additions of Glauber salt and acetic acid

it is possible to get good penetration and level colors, but they are of inferior fastness to washing and light.

Aldehyde Leathers

In many respects this leather, which is better known as "white washable" leather, resembles chamois, and the same methods of dyeing may often be employed. But the actual conditions of dressing vary largely with different manufactures, and some aldehyde leathers have little affinity for dyestuffs.

Combination Tannages

Of the combination tannages that are in vogue, by far the most important is that known as semi-chrome. Huge quantities of leather dressed by this method are used for the shoe trades, as the product has many advantages over straight vegetable tannage; not the least of which is its superior resistance to water. When the semi-chrome process is applied to suede leather, the handle of the leather and nap are also decidedly improved. Semi-chrome leather is produced by stripping some of the tannin present in vegetable tanned stock by drumming in weak soda solution, and then replacing it by working the skin in a basic chrome liquor. Many varieties of imported leather, particularly Indian kips, are only indifferently tanned, and the amount of stripping necessary is slight. Well-dressed semi-chrome leather should withstand immersion in boiling water for a few minutes without injury. As mentioned, when dealing with full-chrome stock the tannage leaves the leather in an acid condition, and this must be neutralized before proceeding with the dyeing. Acid and basic colors are of chief interest for semi-chrome leather, no mordanting being required. Fat liquoring is a necessity and the sulphonated oils give very good results.

Another combination is vegetable and alum tannage. The leather possesses properties of both tannages and is often used for gloving purposes. The dyestuffs employed for vegtable tanned stock are equally applicable.

Fastness Properties of Dyed Leathers

The fastness requirements of colors on leather depends on the ultimate use of the dyed stock. Particularly for upholstery and bookbinding work, the colors should be fast to light. For fancy bags and gloving and clothing purposes the demands are not so exacting as regards light. As a general rule, the basic colors are most fugitive to light. Methylene Blue and Tannin Pink are, however, much faster than acid colors of similar shades.

Some of the direct colors, such as Chlorazol Fast Brown R, Chlorazol Fast Red K, etc., are particularly fast to light, but many are comparatively fugitive. Generally speaking, acid colors are a little superior to direct colors. Such products as Nigrosine, Cardinal, Fast Red, Tartrazine and Resorcine Brown have good fastness properties. The Soluble Blues show a better fastness to light on leather than on wool. The mordant colors, when applicable, are usually of superior fastness to light to those mentioned above. Reference has already been made to the fastness requirements of washable glove leather and to the advantages offered by the sulphide and mordant colors.

Fastness to rubbing is necessary when dealing with most leathsrs, particularly for upholstery purposes. If the leather is finished on the grain side, fastness of color may be increased by shellac, gelatine formaldehyde or collodion finishes, but in the case of suede the application of such finishing products is inadmissible. If acid dyestuffs are employed for suedes, and a good washing follows the dyeing, the colors should not rub off to any extent. When basic colors are used, a sulphonated oil fat liquor after dyeing tends to increase their fastness to rubbing. A similar improvement is shown if the goods are after-treated with a tannin liquor. Except when waterproof finishes are employed, it is practically impossible to produce full shades of color on leather that will not rub off onto a damp cloth. In gloving work it is essential that colors which mark off easily should be avoided.

Many of the difficulties encountered in the application of color to leather may be overcome, or at any rate lessened, by intelligent sorting of the skins previous to dyeing. There are many peculiarities of grain formation, and their affinity for dyestuffs varies, and damage to the grain may arise in many ways.

The color of the tannage is also important, and some latitude should be allowed to the dyer in order that he may re-sort the pack for different colors. The damaged portions of grain surface are more noticeable when the skins are wet than when dry.

Where the grain is damaged by scratches or overpuering, the skins should be used for full shades, and basic colors should be avoided, as these latter usually dye a much darker color on flesh or weak grain. The dyeing should also be quite as deep as the pattern, so that little or no color is needed in the seasoning; or otherwise the weak portions will show up in a very pronounced degree. Another point to be noted is that the use of a combination of colors which penetrate to approximately the same extent give better results on weak-grained skins than those which have a different degree of penetration. For example, browns obtained by the use of a mixture of Acid Orange G and Naphthalene Black 12B give a clearer result on damaged grain than a mixture of Acid Orange G and a Nigrosine.

(To be concluded.)

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

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GETTING THE TEXTILE MANUFACTURER'S NAME BEFORE THE PUBLIC

IT is an undeniable fact, and has heretofore been regarded by textile manufacturers somewhat in the light of an inescapable evil, that in the game of distribution their part is to make the goods and let the middlemen absorb the good-will of the public. In other words, the jobbers, and more particularly of late years the great cutting-up or ready-to-wear trade, through the exploitation of trade-marked garments of every conceivable type, have maintained full control of the situation.

Totally regardless of the quality of his goods, the manufacturer has been unable to protect himself in the event of his labor costs and other overhead increasing beyond that point where he can conveniently do business at former prices, for to most people the names of our great textile mills are unknown; what they pay for is the advertised Hart Schaffner & Marx name or the advertised House of Kuppenheimer reputation, and such concerns as these, the middlemen, have consistently bought on a basis of price rather than quality, and have been enabled at will to shop around among the mills, cancel contracts, and generally lord it over the entire trade. The market has always been a buyer's market because the seller, the manufacturer, is entirely dependent upon the good-will, not of the ultimate consumer, but of the middleman; and hence under the stress of ordinary competition is almost always in a position where his price can be, if not beaten down, at least held stationary. The manufacturer has never been able successfully to force his own reputation through to the consumer.

From time to time Herculean and enormously expensive efforts have been made to establish a direct connection with the public by means of far-reaching advertising campaigns. But these have yielded little in the way of results, for the amount of piece goods sold over the counter, permitting of trade-marked selvedges, is relatively small, and mill trade-marks do not appear upon finished garments produced by the cutters-up.

In some outstanding cases success has been reached, and a good-will tie-up has actually been created where certain manufacturers have been able to force the use of their own label in finished garments; yet the building up of a mill's individual reputation in this manner is a most uncertain and expensive process, and calls for a faith and courage which few manufacturers possess.

That is why so much interest attaches at this time to the plan of H. Gardner McKerrow, who for years has been well known in connection with chemical and dyestuff trade publicity.

Mr. McKerrow's plan, which has the advantages of being direct, obvious, and entirely within the bounds of successful execution, is nothing more or less than that the textile manufacturers themselves go into the cutting-up business, and add the fabrication of finished ready-to-wear articles, as a manufacturing process, to their activities.

The author of the plan states, in a detailed exposition of it, that in certain directions such as the production of finished sheets and pillow cases, this has already been done with signal succes, but why should not this principle be carried much further?

We quote from Mr. McKerrow's statement:

The addition of a cutting-up department, with its necessary equipment of cutting machines, sewing machines and other necessary apparatus, is a legitimate extension of a manufacturer's efforts.

The making of men's and boys' suits, women's suits and coats, aprons, house dresses, dressing gowns, children's suits, frocks and rompers and scores of other articles of a standardized character, offers a wide field for exploitation.

The economic advantages in such an extension of manufacturing effort are too apparent for dispute or denial. The elimination of intermediate profits, the carrying through of the manufacturer's trade-marked label to the retail counters, the assurance to the consumer of the manufacturer's guarantee behind the quality of the goods, are all advantages which would revolutionize the present methods of textile distribution.

And one great and long-felt evil would be wiped out at once—the cancellation of contracts; an evil which is peculiarly to be laid at the door of the cutters-up and the jobbers.

In the cotton industry in New England an opportunity is now afforded for the development of this principle which is unique.

The competition of the South is being felt with increasing force, and in staple goods the political and economic advantages possessed by that region, temporarily at least, are so unquestionable that many pessimistic observers have even predicted that the end of New England's supremacy in the cotton industry is within sight.

While this is probably not correct, the building of Southern branches by Eastern mills, the moving bodily to the South of others, and the decision of many more to make no further capital expenditures in New England, must certainly cause anxiety to those whose interests, financial and otherwise, are lodged on the north Atlantic seaboard.

The probability is that if the Eastern mills will simply change the character of their products, the mills will not be abandoned.

They will look for other classes of manufacturing activity; they will make finer and more specialized goods, and many of them, perhaps, will find themselves in the possession of space and power which cannot be utilized, but which cannot be profitably kept in an unproductive condition.

Why not, then, utilize this space and power in the development of cutting-up departments which would not only present great profit-making possibilities in themselves, but which would produce that long-looked-for and earnestly desired consummation, a direct contact with the consumer so positive and inalienable that to the manufacturer would increasingly belong the reward of his manufacturing ability and reputation.

This is an age of consolidations and association of interests, and such a development would be strictly in line with the modern spirit of progress.

Timid manufacturers will undoubtedly fear the opposition of the intermediate trades whose interests are apparently attacked, but some day one of the large factors in the textile industry, possessed of a spirit of courage and independence, will do this thing, and its success will be so enormous and so immediate that the wonder will be that it was never done before.

When that time arrives textile advertising will become a matter of more or less exact effort to achieve certain well defined results, rather than the inchoate, hit-or-miss proposition it is at present.

The success reached by advertising will be measured by the extent and accuracy with which it is done, with a distinct and definite approach to a market which can be analyzed, rather than the uncertain speculative effort that now prevails.

The executive head of one of the largest textile plants in New England once said to the present writer, "Advertising is never an investment; it is always an expense." Unconsciously this man was impeaching the entire system of textile merchandising when he made this remark. To him, and to thousands of others in the textile industry, advertising is a gamble; there is no way of tracing the results, or of knowing whether or not the efforts made are reaching the attention of the consuming market. Distribution through jobbers and cutters-up gives no indication, and no means of estimation, as to whether this result is being attained.

When the manufacturer's trade-mark, and his reputation as a manufacturer, can be carried directly to the attention of the retail merchant and the consumer new possibilities are at once unfolded.

New media can be used; the daily newspaper can be employed to gain the attention of the consumer, and the trade paper that of the retail merchant.

Advertising, as such, is merely a means to an end; it is simply a part of merchandising. It is not the sole, or even the principal, channel of distribution. The retail merchant must be the convinced and active sales agent for the manufacturer; convinced and active because it is to his interest to be so. And then, when his interest is supported by a direct appeal to the consumer through the local press the problem of effective distribution is solved.

To fully 50 per cent of the population of this country, especially in the small town and rural districts, the great textile mills are merely names; there is no personal knowledge or interest, in the great majority of instances, which would induce the consumer to show any preference for one make of garments or another. Manufacturing reputation means nothing to him or to her; price is the first consideration, and there is no object to the retail merchant in attempting to force a new viewpoint under present conditions.

The great trouble with American merchandising, as far as textile commodities are concerned, is that "price" has always been sold and not "quality," and no alteration of this anomalous condition is possible until the manufacturer descends from his isolated heights, and brings his goods in finished form directly to the retail merchant and the consumer, and convinces them that there is a reliable and responsible guarantee behind every garment purchased.

There is little which can be said here to expand or further emphasize the logic quoted above, save that when such a step is once taken by some more than ordinarily courageous manufacturer, much of the previous successful opposition from the intermediary factors in textile distribution may possibly be overcome by the simple expedient of consolidation. In other words, the "elimination" of the middlemen need not be nearly so destructive as it sounds, for the same machinery of distribution, and personnel, and in the same volume, will be necessary afterwards, and in many cases a change of name would be the principal effect felt by employees of the cutters-up.

That there is a possibility of Henry Ford becoming a textile manufacturer is indicated in an interview with his general manager, published in a recent issue of the Daily News Record. It is pointed out that considerable experimenting on cotton and woolen fabrics has been done at the Ford plant, and that if high prices necessitate such action the Ford company will build and equip mills to produce sufficient woolen and cotton fabrics for its own requirements. The annual consumption of cloth in the production of Ford cars totals several million dollars.

DYES AND THEIR NAMES

Dyestuff nomenclature is quite rightly a standing grievance of all of us who have to use color. The trouble may be said to have originated with the German firms who insisted each on having its own distinctive prefix, which should designate the class to which the color belonged as well as the firm which made it. This was not too bad. A diamine color was a direct dyestuff, manufactured by L. Cassella & Co., and so on. Unluckily, however, the main classes of dyestuffs quickly became subdivided as color groups were discovered possessing slightly different properties from the original range. Thus another word was added to those already in use. Where it was merely a case of "fast" and "brilliant," such as diamine fast yellow or brilliant benzo blue, the designation was made for an obvious purpose, the idea was successfully conveyed and no one can reasonably have been confused. Later came the "diazo" colors, the "para" colors, the "fast to light" colors; after-treatment accounted for a few more distinguishing marks, and the astonishing fact emerges that one firm of German manufacturers alone had in 1914 no less than thirty-six different ways of naming substantive colors exclusive of shade marks (such as "B," "4GL," etc.). There were at that time six major and three or four minor firms, all engaged in the manufacture of roughly the same dyestuffs, competing with each other in the selection of pleasant or high-sounding distinctive names for their own particular offspring, with the perfectly natural result that dyers and colorists had lost touch or had lost count. Cases were not unknown where the firms' own travelers, who had inadvertently left their reference books behind, had failed to recognize their own trade names. This confusion was in reality bad for the color makers. People refused to buy colors which could advantageously replace those in use, for no other reason than that the names were strange and complicated. Occasionally a new color floated into immediate popularity, but in the main the dyer preferred to go on using the old color, with the net result that by far the greater proportion of new colors placed on the market never achieved a sale which made their manufacture a profitable undertaking.

Since the war, matters have gone from bad to worse. All or most of the original German brands are still on sale, and, in addition, all the works in this country and America have concocted a new series of names, to the still greater confusion of the unfortunate buyer. We have been spared the necessity of learning many American names by economic circumstances which do not permit American works to export in bulk to this country. In view of their strange and apparently irrelevant sounds, one is not unthankful. "Amanil," "Osfanil," "Awieo," "Erie" are some names taken at random from a list of American specialties prepared by Dr. Merritt Matthews. His list of some 230 different trade names by no means includes them all.

It is too much; it is even futile, for the end has got lost in the means. Words that were coined to distinguish have only served to confuse.

The complication of names has, however, gone on unchecked for so long that it is not easy to suggest a method by which the issue can be simplified, for it is only fair to recognize that certain colors have always been popular and have come to be regarded as indispensable. Their names, too, are known in every corner of the world where dyeing is practised. It would be manifestly unfair to invite the proprietors of these names to throw them into a common pool. But there are, on the other hand, hundreds of names with which the dyer is acquainted only through the medium of the handbooks lavishly distributed by the German firms before the war. The limited application which many of them found is a proof that their names were no particular attraction.

There would be little or nothing to lose by merging them into a general classification which, with a distinguishing mark for the manufacturing firm, would show the buyer immediately the type and properties of any dyestuff under review.

A further source of irritation is the arbitrary labeling of colors with shade marks. Here again there is no system. It might reasonably be supposed that a red "6B" would be bluer than a red "4B." Assume both colors to be of the same class, manufactured by the same firm, and it usually is bluer. If, though, the colors are of a slightly different character, anything may happen. If they are made by different firms the marks are useless for comparison, unless the brands are exceptionally well known. That is to state in effect that where patent rights have run out and manufacture has become common, the competing firms have given their imitation product a name and mark not so dissimilar to the original as to obscure the fact that the new color has a relation to something already well known. The motive here is obvious, but we have only that to thank for any little system that can be discerned.

Now that the world's capacity for color production is from two to two and a half times the largest possible steady consumption, it seems clear that the majority of factories must manufacture much less than their maximum, while others will probably close down altogether. There is the additional possibility that following the precedent of arrangements concluded with France and Italy, the German interests will reach a working agreement with British makers. The Germans themselves are much more closely bound together than they were before the war, and there is considerably less competition between them.

With these three favorable factors operating toward simpler working, is it too much to hope that when the time is ripe the manufacturers concerned will take pity on the unfortunate user and try to evolve some order out of the present chaotic conditions of dyestuff nomenclature?—Textile Recorder.

THE WATERPROOFING OF TEXTILE FABRICS

(*Concluded from page* 420.)

task, to get the waterproofing agents to enter into the internal structure of the fibers. The reason for this is that the pores of the fibers are very fine capillary passages and the solutions cannot penetrate these openings. When the electric current is passed through a solution of an electrolyte, ionization takes place, and the ions are small enough to be carried by the current into the internal structure of the fibers. It is only through the agency of the current that this can be effected, and it is evident that once these solutions penetrate into the passages, it becomes a very difficult matter to get them out again.

In the practical application of the principle of electrical waterproofing, the fabrics are first impregnated with a solution of a soluble soap, preferably the oleate of soda, and then the soaped cloth, while being saturated with a soluble salt of aluminum, preferably the acetate of alumina, is traversed by the electric current, which carries the precipitated insoluble soap into the internal structure of the fibers.

Preliminary Treatment of the Fabrics

Before a fabric can be properly waterproofed by any of the chemical processes, it is necessary that any filling or loading or sizing material that is contained in the cloth be removed first. Otherwise the waterproofing agents do not have an opportunity to penetrate through the fibers or become thoroughly incorporated with it. It is absolutely necessary to subject the cloth, which it is intended to waterproof by the electrical method, to preliminary treatment, which removes all the sizing matter. Thus cotton fabrics are treated with diastofor and allowed to remain overnight. Then after being thoroughly washed, they are ready for the waterproofing. Woolen fabrics are washed with soap and then rinsed with water at a temperature of 150 deg. Fahr. This treatment removes all the animal fats and oils. The preliminary treatment not only cleanses the cloth but opens up the fine capillary pores so that they can receive the waterproofing agents.

Properties of Treated Cloth

Electrical waterproofing of fabrics—all sorts of fabrics can be treated by this process from the finest silks to the coarsest ducks and canvass, from large meshed bobbinet to plush mohairs—has two effects on the fabric. In the first place, the waterproofing agents are forced into the pores of the fibers and in the second place the surface of the cloth is coated with the same. The reaction between the sodium oleate and the acetate of alumina while the electric current is flowing results in the formation of a precipitate of aluminum hydroxide and a surface coating of basic oleate of alumina. The fact that the basic salt is formed instead of the regular neutral oleate is the reason why electrically waterproofed fabrics can be dry cleaned without their losing their waterproof properties. It is a remarkable fact that the weight of the cloth is scarcely increased by the waterproofing treatment while the fabrics are made very strongly resistant to water. Such cloths will stand up under considerable water pressure before allowing a drop of water to pass through. This pressure is far in excess of any exerted by rains and storms and Tate-treated cloths have been known to stand up perfectly under the severest weather conditions for many consecutive months.

Converting Cotton and Mothproofing Wool

Before concluding this article a few words must be said about the two other important effects that are produced by the Tate process on different fabrics. It was found that cotton goods that had been treated by this process are much improved in appearance. The fibers are straightened out and the feel of the goods is bettered so that a cloth of standard weave is made to appear considerably heavier. The fabric is not stiffened at all. Printed goods are brightened in color and dyes are more firmly fixed to the fibers through the mordanting action of the aluminum salts.

It was also found and substantiated by tests made at the Massachusetts Institute of Technology, extending over a period of eighteen months, that electrically waterproofed woolens are also mothproofed or made moth-repellent. This is not due to any poisonous action of the waterproofing agents, but just to the fact that these cover the fibers so that they cannot be eaten by the moth larvae. The latter actually starve to death. This side of the Tate process is being developed and should be an important factor in that mothproofing industry in the future.

Seville Knitting Mills has been incorporated, with a capital stock of $200,000, to manufacture knitted piece goods and knitted neckwear, for which a plant of Raschel and Jacquard machines will be installed at 568 Broadway, New York City.

Berezein & Rubin, Inc., Brooklyn, N. Y., has been incorporated, with a nominal capital of $5,000, to manufacture dyes and dyestuffs. The incorporators are S. Berezein ,B. Rubin and J. S. Perlman. The company is represented by A. L. Berman, 346 Broadway, New Yorkk City.

The Herbst Chemical Corporation, New York City, has been incorporated, with a capital of $20,000, to manufacture chemicals, dyes, etc. The incorporators are M. and S. B. Herbst. The company is represented by Hyman Bushel, 1482 Broadway, New York City.

Scientific Washing

IV—Heat

"Dirt" and Its Reactions Under Heat—Heat Stimulates Emulsification—When High Temperature Is Unwise—The Cause of Soap Specks—Heat in the Bleaching Bath

By F. H. GUERNSEY

Chief Chemist, the Cowles Detergent Company, Lockport, N. Y.

THE application of heat to wash liquors as used in the laundry wash wheel has both its good and ill effects. The good effects surpass their opposites in importance to such an extent that hot water washing has been universally accepted, and yet few people give the "whys and wherefores" of this practice more than casual thought.

Heat may be employed either in the form of steam, hot water, or both. Hot water is the best general method, as there is a tendency for steam to set stains. Overall wheels are frequently equipped with steam connections so that a boil may be given if desired.

Few people appreciate the importance and value of water as a cheap and efficient washing medium. Its great solvent powers and stable chemical composition (pure water) under different conditions contribute to its inestimable value.

"Dirt" and Its Reactions Under Heat

There are many classes of dirt which are soluble in plain water. These include sugar in its various forms, prepared starch, certain portions of soil, some fruit juices, medicines, etc. In most cases their solubility in water is increased in warm or hot temperatures. Any insoluble dirt which is bound to the fabric by sticky (sugar) dirt is thus freed for removal by other means. There is a separate discussion in this series devoted entirely to "dirt." In it will be found many additional facts of interest relating to classification of dirt.

In the washing process there are many chemical reactions or combinations between dirt and the detergents used. Chief among these is the neutralization of dirt which is acid in character. Greases, for instance, always contain a certain amount of fatty acid. The heat of cooking usually increases the amount present, and during the summer months the amount of fatty acid frequently amounts to 18 per cent of the total grease present. Furthermore, much of this fatty acid is solid material at ordinary temperatures. In the wash wheel the heated liquor causes these solid fatty acids to melt and "flow," in which condition they quickly combine with the alkali present to form soap.

In some cases, were it not for the fact that good hot water was employed, it would be quite impossible to get the desired amount of soap into the solution. The application of heat greatly increases the solubility of soap in water, as we have all observed in the operation of the "soap tank." Even the low concentrations employed in the wheel would produce a solution too jellylike and viscous for effective cleansing if we tried to wash at room temperature.

It might be said at this point, however, that prolonged cooking of soap in the soap tank promotes decomposition and "kills" the soap to some extent. Although not pronounced in effect, it is an additional point in favor of the use of materials in dry form.

Heat Stimulates Emulsification

One of the most important physical actions in the washing process is that of emulsification. This action is quite dependent upon the surface tension of the solution. A low surface tension is most desirable and in the case of liquids or solutions, such as a soap solution, the tension decreases with the rise in temperature until the boiling point is reached. Hot water in agitation is, therefore, a better emulsifying medium than cold water in agitation

The hot water emulsion should, however, be discharged from the wheel while hot. If an emulsion of this kind should be permitted to cool off or be chilled by the introduction of cold water, the emulsion would very likely "break," the oil and grease being deposited in the goods again. This practice was adopted because it "worked better" and perhaps many have never stopped to wonder "why."

Another issue to contend with at this point is the possibility of closing the pores of the fabric in the presence of much loosened dirt. Most of the dirt should be removed before the load is allowed to cool off.

When High Temperature Is Unwise

On Albumin.—As stated above, heat has its uses and abuses in the wash wheel. For instance, there is always a certain amount of albuminous dirt present in the goods. These substances have the property of coagulating at

temperatures above 120 deg. Fahr., and this, of course, should not be allowed to take place in the fibers. A wise precaution, therefore, is to keep the temperature below this point during the early operations, or until the albumins have been removed by solvent action in the alkaline bath. Temperature of 90 deg. is perfectly satisfactory for the first bath or "break," and in fact is to be recommended whenever detergent materials are used at this point.

On Wool.—Temperatures above 120 deg. Fahr. induce felting and compactness in woolen fabrics. Silk will stand a slightly higher temperature than wool, but both classes should be separated from the cotton and linen and washed at the lower temperatures.

On Soap.—Temperatures above 180 deg. Fahr. frequently induce excessive hydrolysis or decomposition of the soap. This action is usually indicated by the suds "falling." The possibility of soap decomposition may be precluded to a certain extent by the use of a safe alkaline stabilizer which exerts a protective influence on soap. Especially is this good practice in the hot rinse after suds. Care should be exercised to select a detergent in which the alkali is perfectly controlled, such as the prepared products, Sol-Esco and Soapalite, which are ideal for the purpose.

The effect of heat on modified sodas should be noted. These sodas contain sodium bicarbonate as a modifying agent. Heat, as used in the soap tank or wash wheel, rapidly decomposes bicarbonate, with the formation of soda ash. The modifying action of these sodas is, therefore, largely lost through the effect of heat, and especially in the soap tank where heating is prolonged.

The remedy lies in the use of a stable alkaline detergent in which the controlling element is not destroyed by heat.

On Colors.—Colors, always a bane to the launderer, are subject to some decomposition at the higher temperatures. Moderate temperatures and careful selection of the alkaline soap stimulant are advised. All our mineral detergents carry in their composition colloidal mordants, which will prevent or diminish the tendency of certain colors to bleed.

The Cause of Soap Specks

We mentioned the use of a hot rinse to follow the last suds. This rinse should not be hotter than the load itself. Considerable soap remains in the goods at this stage, and a large volume of very hot water will tend to decompose and dilute the soap to such an extent that considerable of the fatty acid constituent (of the soap) will be deposited in the goods as "soap specks" or "grease specks." The use of a small amount of mineral detergent in this first rinse will prevent the decomposition of the soap and eliminate the danger of speck formation.

Heat in the Bleaching Bath

There are some differences of opinion in regard to the effect of heat on bleach. However, carefully conducted experiments have shown that good results are obtained at temperatures between 120 deg. Fahr. and 160 deg. Fahr. in five minutes. These tests showed that at 160 deg. Fahr. bleaching for three minutes gave results which required five minutes at 120 deg. Fahr. and ten minutes at 60 deg. Fahr. The loss of chlorine and oxygen to the air at 160 deg. Fahr. was found to be insignificant.

Summary

To sum this discussion up, we should note that heat is indispensable for good washing, but it must be used judiciously and to best advantage. The following chart which shows the effects of excessive temperatures and scientific temperatures in parallel columns will be found useful. It can be stated with all confidence that about half the troubles experienced in washing are due to unwise procedure with respect to heat:

SCIENTIFIC TEMPERATURE	EXCESSIVE HEAT
Melts Solid Fats	Decomposes Soap into Fatty Acid Products (160 deg.)
Breaks Lumps of Dirt	Causes Colors to Run (130 deg.)
Dissolves Soap	Sets Stains
Stimulates Emulsification	Felts and Shrinks Wool (120 deg.)
Aids Saponification	Coagulates Albumins (120 deg.)
Controls Bleaching	Forms Soap Specks
Promotes Reactions between Detergents and "Dirt"	
Opens Pores of Goods	

HEAT IS INDISPENSABLE TO GOOD WASHING, BUT MUST BE USED SCIENTIFICALLY

Temperatures exceeding 160 deg. Fahr. are not advisable in the presence of soap. Wool and silk should be washed at about 120 deg. Fahr.; colors at about 130 deg. Fahr., unless in connection with a color-protecting detergent; albumins should be removed below 120 deg. Fahr.; hot rinsing should be done at the temperature of the load at that point.

Use a thermometer to familiarize yourself with the "feeling" of temperatures required. Guessing is dangerous and inefficient in deriving proper action from materials.

TEMPERATURE SCALE FOR WASHING OPERATIONS

BREAK—Not over 90 deg. Fahr. to 100 deg. Fahr.
FIRST SUDS—Not over 140 deg. nor under 100 deg. Fahr. (For one suds work, 140 deg. at beginning, 170 deg. Fahr. at finish.)
RINSE—Same temperature as the load at this point.
SECOND SUDS—Not over 170 deg. nor under 140 deg. Fahr. (Colored Loads at 130 deg. to 140 deg. Fahr.)
RINSE—Same temperature as the load at this point.
BLEACH—120 to 160 deg. Fahr.
SOUR—Normal Souring at 140 deg. to 170 deg. Fahr. (For Lime Speck removal, 180 deg. Fahr.)
BLUE—Cold.

WOOL—Lukewarm throughout the wash. Variation causes shrinkage.
OVERALLS—Begin at 150 deg. Suds bath at 170 deg. to 180 deg. Fahr. Pull at 160 deg. Fahr.

Varying the Cassimere Finish

The Close Finish—Raising the Nap—Shearing the Cloth—The Velour Finish—The Natural Finish

By O. FISK

THE manipulation of treatment of cassimeres in the finishing department depends largely upon the stock and the construction of the cloth, as well as the final result desired in the finished fabric. Three distinct results may be obtained, each of which may be subject to variations demanded by the selling agent to meet the requirements of the buyer. These results or characteristics of finish may be designated as the close or thread finish, the velour finish, and what is often termed the natural finish.

The Close Finish

The close or thread finish requires that all the felt and fibers be removed from the face of the cloth so that the woven construction may show up clear and distinct, very similar to the face appearance of a worsted cloth. Much depends upon the construction of the cloth, which may vary so as to demand more or less work in the finishing, as the case may be.

If the construction be such as to require considerable fulling, and a consequent density of felt, it will call for skillful treatment in the gigging so as to "clear up" and bring out the woven effect and coloring clear and distinct after the shearing process. When less fulling is required, the pattern may be cleared up with less gigging, but it will be at a certain sacrifice of the firm and clothy feel of the fabric.

Whatever the woven construction, the same results as to clearness of the face are required, and skillful treatment, together with the exercise of good judgment, must accompany every detail of the work. In the fulling of this class of goods an extreme shrinkage in length should be avoided. The construction should be such as to give the cloth the desirable weight and handle with a shrinkage in length not exceeding 10 to 15 per cent.

As to clearness of the pattern, a good result may be secured by a finish of loom length, but the feel of the cloth, which is a desirable feature, would not be so good. To secure good results in fulling, the soap should be of sufficient alkaline strength to thoroughly saponify the grease contained in the goods, and of sufficient body to hold in suspense all the foreign matter during the fulling process.

If the cloth is composed of virgin wool, and the oil used on the stock is of a kind that is readily saponified, the goods may be cleaned by a proper use of warm water, but if the stock contains any considerable amount of shoddy, or from any other reason is difficult to clean, a suitable scouring soap will be required to insure good results. This is a matter that requires good judgment.

Raising the Nap

As already stated, the amount of work required in gigging or napping depends upon the amount of felt covering the face of the cloth, and great care should be taken both to properly do and to avoid overdoing this work. If the cloth is but slightly felted the gigging may be done by the use of well-worn or a medium grade of teasels. If well felted, the work should begin with the above and be finished with a better grade, as in the judgment of the finisher may be required.

In any event, sharp work should not be employed to start, nor used until there is sufficient nap secured to protect the cloth from injury by its use. Care should also be taken to have the cloth sufficiently moist. If too dry, the teasels or napper wire will cut the threads, thereby injuring them as well as endangering the strength of the cloth. By maintaining the right moisture the nap is properly raised, the woven structure and the perfection of the threads remain intact, and undue waste is avoided.

If the napping is done on a single-cylinder gig, it is a good plan to reverse the nap when the work is nearly completed by giving the cloth just enough runs in the opposite direction to turn the nap. This will avoid the sharp or raspy feel to the face of the cloth when finished that a continuous napping in one direction produces.

If a double-cylinder gig is used, the cylinders may be run in opposite directions until the work is nearly completed, when both cylinders may be run in the same direction, one or two runs to finish.

Shearing the Cloth

If the wire napper is used, the reversing of the nap is not required, as the reverse action of the napper rolls tends to pick up the fibers and is devoid of the dragging effect that characterizes the action of the teasel gig. To determine when sufficient gigging is done, carefully part the nap; if the individual threads show up clear and distinct no more work will be required.

In the shearing process the work should not be hur-

ried. The blades should be set up from twelve to sixteen notches above the finishing point and lowered a little for each run, until the nap is all removed and the pattern shows up clear and distinct. Do not force the blades too closely to the cloth, which will give it a scraped or worn appearance. Two or three runs a little higher up will clear the pattern as well and leave the cloth with a soft and agreeable feel. A variation in weight may require a slight variation in the adjustment of the blades or the runs to be given, and shearing to a sample is more likely to result in a uniformity of shade or finish.

Opinions vary as to which side up the cloth should go through the press. It is the writer's opinion that the face of the cloth should run next to the bed of the press. While this tends to increase the raspy feel of the cloth, this effect will be removed by the subsequent steaming.

It is desirable to run the cloth on to rolls and to allow it to lie over at least twenty-four hours before removing. It will, of course, be understood that in pressing and steaming the cloth should run so that the brushes will work in the direction of the nap.

The steaming is designed to remove the gloss which the pressing has given to the face of the cloth and to produce a soft and desirable feel. Great care should be taken to avoid, so far as possible, any forcing of the steam into or through the cloth to destroy the solidity given in pressing, the object being to act only upon the face of the cloth. To this end the steamer should be covered with a well-felted cloth, which will insure an even distribution of the steam and at the same time cause it to strike the cloth entirely devoid of force, so that it may act upon the face and not force itself through the cloth.

The cloth should be at least 1 inch above the steamer covering. If allowed to touch it the pressing result will be injured. The amount of steam should be kept at the lowest possible to insure the removal of the gloss on the face of the cloth. The pieces should be sewed or wired together in order to avoid stopping with the cloth over the steamer.

The Velour Finish

The velour finish differs from others in the cassimere line, in that it requires a well-felted cloth and a density of nap, a part of which is left to give the velour effect. To secure the best results the cloth should be constructed with a view of shrinking in length not less than 15 per cent.

In the gigging or napping the object should not only be to clear up the face but to secure as perfect and as dense a nap as possible, and to guard against having it lie very decidedly in either direction. In other words, to produce as nearly as possible a standing nap. To obtain this result the work should begin with well-worn teasels, then change to a medium grade, and finish with new or nearly new work.

At every change remove every other slat, the poorest in the cylinder, and plan to do the most of the work before the last change. Reverse the nap with every change, and this will turn it with the final set of teasels in the same direction as at the start, when two or three runs should be given to complete the work. The reversing aids in securing a thick nap as well as avoiding its being laid too much in one direction.

When the cloth is dried give it a dry beating; that is, one or two runs on the gig with a medium grade of teasels, with the tension of the cloth as slack as it will run. This will lift and soften up the nap without reaching the face of the cloth. The shearing, pressing and steaming should be done as above described for the close finish, except that enough nap should be left in shearing to give a soft, velvety effect.

With the nap raised as directed, the color effect and pattern will show up distinctly and a most pleasing and agreeable feel will be given to the cloth.

The Natural Finish

The natural finish is usually given to goods that are sufficiently free from felt as to be cleared up without any gigging. The layout in the loom is more on the worsted order, or the cloth is composed of a percentage of non-felting stock, so that only shearing is required to give it the desired clear effect.

With the slight fulling given, it is often desirable to omit the steaming after pressing, as the stability of the finish might be impaired. It will be understood that what is said above in regard to fulling and scouring soaps applies to each kind of finish described.—Textile World.

EFFECTS OF CHLORIDE IN FINISHING

Damage may be done to cloth in the finishing process due to presence of certain chlorides in warp sizing mixtures, unless the matter is properly understood. Some operators may not be familiar with this effect or understand it. They may not know the nature of their sizing materials. Magnesium zinc and calcium chlorides cause most of the trouble, because they break down under heat to a certain degree. The chlorine or acid liberated does the damage. These chlorides are used because they tend to take up water and their presence helps the cotton yarn. If pure samples of these chemicals are placed on clear paper, even in a relatively dry room, they will appear moist or wet in an hour or so. Zinc chloride prevents molds and mildew as well. Few sizing materials have more than 1 per cent of zinc chloride, but may have much more of the other salts. Calcium chloride is the less harmful. It may be used in combination with magnesium sulphate.

The Effect of Light on Fibers Dyed with a Mixture of Chrysaniline and Fuchsine

Stobbe's Conclusion—Chrysaniline More Fugitive Than Fuchsine—Protective Action of Latter in Mixtures —Results of Water Solution Tests

By W. W. PADDON
Cornell University

STOBBE[1] states that a mixture of chrysaniline and fuchsine fades faster than either dye by itself. An attempt to verify this statement led to an entirely different conclusion.

One gram samples of wool were dyed from the following baths. The total volume of the bath was in every case 250 c.c. The wool was entered cold into the boiling bath, removed hot after forty-five minutes' boil, rinsed in cold water, and dried in the open room. The following samples were dyed:

TABLE I

Smp. No.	Conc. of Orig. Bath mg. dye per 250 c.c.	Smp. No.	Conc. of Orig. Bath mg. dye per 250 c.c.
1	30 mg. chrysaniline	4	30 mg. fuchsine
2	75 mg. chrysaniline	5	75 mg. fuchsine
3	150 mg. chrysaniline	6	150 mg. fuchsine
	Dyed in separate baths, first with chrysaniline and then with fuchsine.		Dyed in separate baths, first with fuchsine and then with chrysaniline:
7	75 mg. chrysaniline 30 mg. fuchsine	11	30 mg. fuchsine 75 mg. chrysaniline
8	30 mg. chrysaniline 75 mg. fuchsine	12	75 mg. fuchsine 30 mg. chrysaniline
9	30 mg. chrysaniline 150 mg. fuchsine	13	150 mg. fuchsine 30 mg. chrysaniline
10	150 mg. chrysaniline 30 mg. fuchsine	14	30 mg. fuchsine 150 mg. chrysaniline
	Dyed from one bath, the bath containing both dyes as specified:		
15	75 mg. chrysaniline 30 mg. fuchsine	17	30 mg. chrysaniline 150 mg. fuchsine
16	30 mg. fuchsine 75 mg. chrysaniline	18	150 mg. chrysaniline 30 mg. fuchsine

When the samples that were first dyed in fuchsine were placed in the chrysaniline baths, they bled to a marked degree, showing that to some extent chrysaniline replaces the fuchsine on the fiber. The samples Nos. 11, 12, 13 and 14 had adsorbed less fuchsine than Nos. 4, 5, 6 and 7, respectively, although dyed from baths of the same original concentrations.

These dyed fibers were now exposed to the light from the violet carbon arc of a "Fade-ometer." Three hours' exposure to this light is equivalent to five hours' exposure to Arizona sunlight.[2]

In Table II are given the samples which had shown noticeable fading at the end of the given number of hours:

TABLE II

Exposure	Samples Showing Noticeable Fading
3 hours	1-3
6 hours	1-3, 14, 15, 18
18 hours	1-3, 14, 15,18
31 hours	1-3, 10, 11, 14, 15, 18
100 hours	1-3, 10, 11, 14, 15, 18
131 hours	1-3, 7, 10, 11, 14, 15, 18
205 hours	1-3, 7, 10, 18
	Unfaded,, 4-6, 8, 9

The data in Table II show at once that chrysaniline alone on the fiber is more fugitive than any of the mixtures of the two dyes tried. Furthermore, the mixed colors fading first are those in which the minimum amount of fuchsine used is present. The samples dyed with fuchsine alone or with mixtures containing an excess of fuchsine over chrysaniline, the fuchsine being applied last, had not faded at the end of 205 hours, when the test was concluded.

These results indicate that the fuchsine, which was in itself shown to be relatively fast to light, exerts a protective action against light on mixtures of fuchsine and chrysaniline. A further verification lies in the fact that sample No. 14, which was dyed first in fuchsine and then in chrysaniline, started to fade twenty-five hours before sample No. 10, on which the fuchsine was applied last. Sample No. 11, dyed last in chrysaniline, faded 100 hours before No. 7 which had been dyed under the same conditions, except that the fuchsine was applied last.

The absorption spectra of solutions of varying concentrations of fuchsine were compared with the absorption spectra of solutions of chrysaniline of the same concentrations and thicknesses. The absorption band for fuchsine solutions extends from the extreme violet end of the visible spectrum into the blue or green depending on the concentration, but in every case except the most extreme dilution the fuchsine band was broader than the

[1] Zeit. Elektrochemie, **14,** 481 (1908).
[2] Gordon: Textile Colorist, Jan., **1921,** p. 29.

broadest chrysaniline absorption band. Since it has been shown that fuchsine alone is relatively fast to light it is safe to say that it protects the chrysaniline and hence a mixture of chrysaniline and fuchsine where the fuchsine is applied last; for it absorbs the light that would be absorbed by the chrysaniline and which would therefore tend to fade the chrysaniline.

Experiments were also carried out on water solutions of the dyes. Solutions of chrysaniline alone and fuchsine alone and of mixtures of the two were exposed to the light of the "Fade-ometer." The chrysaniline solutions alone faded in ten hours while the fuchsine solutions and the mixtures containing fuchsine showed no fading at the end of thirty hours. Five cc. of 3 per cent hydrogen peroxide was now added to each solution (volume originally 10 cc.) and the samples again exposed to light. In five hours the chrysaniline had not faded further appreciably, but the fuchsine solutions were completely bleached, and the solutions containing fuchsine and chrysaniline had assumed a yellow color, which became less and less pronounced as the exposure to light continued, and which was undoubtedly due to the chrysaniline of the mixture. Chrysaniline is not bleached, under the conditions of the experiments, by hydrogen peroxide while fuchsine is. The hydrogen peroxide first removes the protecting fuchsine and the chrysaniline is then faded by the light.

Exposure to light of samples of wool dyed with both fuchsine and chrysaniline, and of water solutions of the two dyes demonstrate conclusively the protective action toward light of fuchsine on chrysaniline. The surprising thing about these results is the relative stability of fuchsine. It was supposed that this dye would be much more fugitive than it has turned out to be under these conditions.

This work has been carried on under the direction of Prof. Bancroft and was made possible by a grant from the Chemical Foundation.—Jour. Phys. Chemistry.

Oils Used in the Textile Industries

Olive Oil—Causes of Oxidation—Olive Oil Mixtures—Defects in Worsted Piece Goods Due to Use of Unsuitable Oils—An Attractive Field for Research—Emulsifying Agents

By L. L. LLOYD, PH.D., F.I.C.

OLIVE oil is used in the worsted industry because of the so-called non-drying oils it is among those obtainable in sufficient quantity and at a reasonable price; it is the most stable, and it has fewer objectionable properties than other non-drying oils. I have proved, however, that the free fatty acids of olive oil oxidize more readily than the neutral oil, the free fatty acids becoming almost completely oxidized by slow oxidation before the neutral oil shows signs of oxidation. Neutral olive oil—that is, oil free from free fatty acids—will, however, become oxidized in a sufficiently long period to form a viscous mass. This oxidation is aided by elevated temperature and the influence of direct sunlight.

The comber objects to olive oil of high free fatty-acid content, because it attacks the steel pins of the comb. This action is aided by the electrolytic couple formed by the steel pins and the brass setting, but this could be greatly reduced by the employment of a different method of fixing the steel pins whereby a couple would not be formed, and the life of the comb would probably be lengthened thereby.

Oxidation of Olive Oil

The oxidation of olive oil is increased by secondary reactions in which the olive oil is decomposed into free fatty acids and glycerol. These decompositions are brought about by means of bacteria, fungi, and enzymes, all of which have access to the oil when distributed on wool in either wool or worsted material.

The author stated last year that tea-seed oil was particularly liable to the production of faulty dyed pieces, from a chemical and physical examination of the oil, which would lead to the production of oxidation and polymerization products that would not be removed by ordinary scouring methods as applied to worsted goods. The bright and hot and lengthy summer of 1921 was a factor which helped to cause the trouble, due to the use of this oil, that produced so many faulty finished goods during last year.

The statement mentioned above that the free fatty acids of olive oxidize before neutral oil, is applicable to all oils; the more unsaturated the free fatty acids, the more readily will they oxidize. When one considers more readily oxidizable oils, however, the less is the relative rate of oxidation of the free fatty acids and of the neutral oil. Oxidizable oils, even in small quantities, when mixed with the non-drying oils, increase the rate of oxidation catalytically—that is, they act as carriers of oxygen from the atmosphere to the non-drying oils. Iron and copper are very active oxidizing catalysts, and even minute traces of these metals will have a detrimental effect on the oil on worsted. These metals may be easily carried

into the yarn by frictional contact during the spinning operations.

Olive Oil Mixtures

Nut or Arachis oil, tea-seed oil, or mixtures of these along with olive oil, are objectionable in the worsted industry, but good results are, and have been, obtained from the use of these oils. They should, however, only be used in self-contained works where the period from top to finished product is relatively short; they should not be employed on commission work where the conditions of storing and period from top to finished product is a very variable and unknown factor.

The defects on worsted piece goods due to the use of unsuitable oils are in many cases apparent in the goods in the gray state, and often observable after the material has been scoured. In many cases the effect may not be observable in the gray or scoured state, but becomes apparent only when the goods have been dyed. This is due to the difficulty of removing the oxidized oil by ordinary scouring methods, and, since the oxidation of the oil is not perfectly uniform throughout the material, it is rendered apparent by the difference in the penetration and absorption of the dyestuff, and also in the different light-reflecting properties of various surfaces.

On material that has to be crabbed, the defect due to oxidized oil is increased; the action of heat upon the oxidized oil modifies its chemical and physical properties to a far greater extent than is the case with unoxidized oil.

Mildew, or other fungi, when developed on wool, modifies the properties of the material to a marked extent, and particularly in regard to dyeing. Certain oils are also affected by fungi with liberation of free fatty acids and glycerol; the former will undergo changes due to oxidation and polymerization much more readily than the neutral oil. A similar change is brought about by bacteria and enzymes.

An Attractive Field for Research

Here is a field of research which would be of great benefit to the worsted industry. As far as the author is aware, few agents are employed as preventives against these reactions, although a few compounds are used for treating yarn to prevent mildew. The author has carried out a number of experiments with a view to preventing or retarding oxidation of oils, and quite a number of agents have been found to be useful for this purpose; at present, however, these are only of scientific interest, on account of other actions of these agents on the worsted whereby the dyeing and finishing properties of the material are too largely affected.

In connection with emulsifying agents, it should be stated that wool creams are not objected to by the author unless a sulphated oil or other noxious products are employed in the production of these creams. It has been stated that if sulphated oil is a constituent of a wool cream, it will be sufficiently evenly distributed over the material prior to spinning to ensure level results. If this treatment were applied to one batch of wool for both warp and weft, the results should be satisfactory; but where different batches are used for warp and weft, an imperfect result will be obtained, on account of the different dyeing properties of the warp and weft towards the majority of dyestuffs, and of different light-reflecting properties.

Many chemists object to the use of non-saponifiable oils in the wool and worsted industries, because they are more difficult to emulsify, and, consequently, are not readily removed by scouring. It might be pointed out that in the wool trade oil composed of equal parts of fatty acids and mineral oil is very largely used for oiling the wool prior to spinning. This mixture, or similar mixtures containing mineral oil, fatty acids, and saponifiable oils, is completely removed by scouring woolen goods before dyeing or milling. Such mixtures of oils cannot be used in the worsted trade because the oil may become thoroughly oxidized on account of such thin films being exposed to the atmosphere. Mineral oil bleached or debloomed also undergoes modification on exposure to light and air, but not after chemical treatment to give a stable product.

Another neutral compound is worthy of mention; it is obtained by distilling neutral wool fat in superheated steam under reduced pressure. The distillation product contains olein (oleic acid) and higher melting-point acids, along with a neutral product that is much more fluid than neutral wool fat, but not as fluid as olive oil. This neutral compound may be easily emulsified; it does not oxidize on exposure to light and air, but is oxidized by neutral bichromate, or more readily by acid and bichromate. It is, therefore, a product that may be used in either wool or worsted operations.—Jour. Textile Institute. Paper read before the Yorkshire Section.

NEW DIRECT BLACK INTRODUCED BY THE UNITED CHEMICAL PRODUCTS CORP.

Under the name of Direct Fast Black L, the United Chemical Products Corporation, of Jersey City, N. J., is introducing a new color of its own manufacture which it says is in every way equal to the pre-war Benzo Fast Black L. This concern is also working on the development of several other fast colors which will be placed on the market from time to time in the near future.

Export markets for Italian cotton goods are growing. An increasing market in France is noted, but Italian mills are suffering from a lack of orders from the Balkan and Near Eastern countries. It is expected that the ratification of the treaty of Santa Margherita will enable Italian cotton manufacturers to increase the volume of their trade with Jugoslavia.

INQUIRY DEPARTMENT

All classes of chemical work or advice relating to artificial colors, natural dyestuffs, dyewoods, raw materials, extracts, intermediates, crudes, or dyeing chemicals and accessories in general, will be carried out for readers and subscribers of the AMERICAN DYESTUFF REPORTER by this department.

Inquiries of a minor character will be answered on this page, while major matters involving personal investigation, analyses, perfected processes and working formulas, will, if desired, be treated confidentially through the mails. In answering inquiries which, by their nature, require reference to the products, processes or apparatus of some particular manufacturer we aim to be absolutely impartial. We refer the inquiries to specialists whom we believe to be best qualified to answer them intelligently, and must disclaim responsibility if their reports show unintentional bias. All questions, materials for analysis or letters leading to the opening of negotiations for special work will receive prompt attention if addressed to Inquiry Department, American Dyestuff Reporter, Woolworth Building, New York City.

L. P. R.—*Question:* We have been trying to obtain an Aniline Salts Black for printing on warp yarn but find that it tenders the yarn. Have you a formula which will work successfully without injuring the yarn? Am enclosing a sample of the print.

Answer: We beg to advise you that in our opinion cases where tendering results from this process are generally owing to local conditions rather than to a faulty formula.

We believe that most of the formulae found in standard textbooks, such, for instance, as Knecht and Fothergill on Calico Printing, will produce satisfactory results, if they are properly adjusted to suit individual cases. It is a known fact that such factors as temperature, steam pressure, rapidity of run, etc., will materially effect the acidity of the paste and the condition of the finished goods.

In other words, we believe that your case is one for the careful consideration of an expert in this process and would suggest that you communicate with the manufacturer who supplies your aniline salts, who will, no doubt, be able to send you a technical man who can correct the difficulty.

If extreme fastness is not required there are, of course, other blacks which can be used without any danger of tendering the yarn.

We should like to be able to give you a "foolproof" formula but, unfortunately, in an operation as delicate as this it is an impossibility.

C. C. W. Co.—*Question:* Enclosed find sample of type of letter that we would like to use on printing names on cloth. These, we understand, are blocked out in brass with felt insert. We would highly appreciate names of manufacturers of these type, if you can send us same.

Also would appreciate names of manufacturers of cloth and yarn printing machines for our files.

Answer: We believe that you can obtain type of the sort you inquire about from either the Dixie Stamp & Seal Company, of Atlanta, Ga., or from F. L. Mealey, Lowell, Mass.

As to manufacturers of machines for printing cloth and yarn we would suggest the following: H. W. Butterworth & Sons Company, Philadelphia, Pa.; Leigh & Butler, Summer Street, Boston, Mass.; Rice, Barton & Fales, Worcester, Mass.; The Textile-Finishing Machinery Company, Providence, R. I.

All of the above specialize on piece goods, but may make some yarn printing machinery. Charles A. Luther & Co., Central Falls, R. I., specializes on yarn printing machines.

G. S. D.—*Question:* We enclose herewith some silk and wool crepe which we have degummed and which you will note has turned dark.

We have experienced men who have done this work and they have never encountered this trouble before.

Possibly you would be good enough to advise us in this connection. Would it be due to the fact that we are using lead piping for our steam coil in the degumming tub instead of copper piping?

Answer: We are not able to give you any very satisfactory suggestions because of lack of sufficient details. Won't you please send us a swatch of the material as it should appear after having been degummed? Also let us know the process you used and if possible give us a swatch of the original material before degumming and tell us just how this operation had been carried out.

It is possible that the wool used in this material is what is known as chlored wool, which would give it a yellowish tint as well as a peculiar affinity for any coloring matter which might be present in the boil-off. If the silk had an individual throwtser's color present, especially a violet, this throwster's color might be removed from the silk in the boil-off and affixed on the wool which would give the taupe appearance noticeable.

We doubt if the lead piping is responsible.

C. S.—*Question:* Can you please tell the writer the method used around Paterson, N. J., for mordanting and dyeing with Logwood and Hematine, charmeuse silk piece goods, the same as sample attached?

Answer: Inquiry reveals that there is nothing which could be termed a standard formula for this work and most of the dyers are extremely loath to discuss their own methods. The following method, however, is in use by one of the larger silk dyeing concerns and will very likely serve your purpose:

For fifty pounds of silk, wet out the material in water 50 deg. Fahr., rinse in cold water slightly acidified with muriatic acid, wash thoroughly in hot water and rinse again in cold water. The goods are then dyed with ten

pounds of Fustic Extract and fifteen pounds of Copperas and one pound of Copper Sulphate; boil for two hours and wash thoroughly in cold water. The goods are then dyed in a second bath with six pounds of Hematine Crystals and fifteen pounds of Red Oil Soap; boil one to one and one-half hours, rinse thoroughly and extract.

Review of Recent Literature

Manual of Industrial Chemistry. Edited by Allen Rogers. Third edition, thoroughly revised and enlarged; 1,255 pages, 6½x9½; 377 illustrations; flexible fabrikoid; $7.50. New York, D. Van Nostrand Company.

Although not in any sense of the word a dyestuff or textile volume, the present edition of Rogers' Manual of Industrial Chemistry is a fitting subject for mention to textile men and colorists if for no other reason than that it is probably the most comprehensive single-volume treatment in the English language on industrial chemistry, and is the very useful and beneficial result of the cumulative effort of forty-three prominent experts of acknowledged wide experience, who have presented authoritative data on modern American practice.

Of particular interest to REPORTER readers, however, is the section on Dyestuffs and Their Application prepared by Louis A. Olney, while the section on Textiles is handled in able fashion by J. Merritt Matthews. Of allied interest will be found the sections on Coal Tar and Its Distillation Products, by F. E. Dodge; Commercial Organic Chemicals, by Allen Rogers; Soaps and Soap Powder, by Lincoln Burrows; Laundering, by W. F. Faragher; Essential Oils, Synthetic Perfumes and Flavoring Materials, by Alois von Isakovics; Paper Making, by G. F. Lull; Cellulose Industries, by Jasper E. Crane; and Leather, by O. W. Willcox.

We cannot forbear to mention in passing that it is entirely possible that a certain melancholy and academic interest may also be taken in the sections devoted to such proscribed products as Wine, by L. W. Haas, and Distilled Liquors, by Gustave L. Goob. But perhaps, after all, their place in the present work is warranted; their production may not become listed among the Lost Arts —and indeed, who knows but what we may be witnessing the dawn of an era of efficiency in small-scale operations hitherto undreamed of.

The editor and compiler, Allen Rogers, in charge of industrial chemistry at Pratt Institute, Brooklyn, N. Y., needs no introduction. Besides contributing several sections himself, he has exercised particular care to cover the most modern developments, and consequently many chapters were revised and enlarged in order to make them reliable and up to date. A feature of the work which will make an especial appeal is that while it presents all the available trustworthy scientific information on a wide field of technical effort embodying practically every manufacturing industry, it is almost entirely free from descriptions of old and obsolete processes. Another valuable feature is the presence of copious bibliographies following each section.

The list of contents, which we give in condensed form, follows:

General Processes, by Allen Rogers; Water for Industrial Purposes, by H. Stabler and A. A. Chambers; Fuels, by J. C. W. Frazer; Sulphuric Acid, by W. M. Grosvenor; Nitric Acid, by W. M. Grosvenor; Salt and Hydrochloric Acid, by O. L. Shinn; Elements and Compounds, by Allen Rogers; Chlorine and Allied Products, by W. F. Doerflinger; Electrochemical Industries, by W. L. Landis; Lime, Cement and Plaster, by Richard K. Meade; Clay, Bricks, and Pottery, by Allen Rogers; Glass, by James Gillinder; White Lead, by G. W. Thompson; Zinc Oxide, by George H. Heckel; Pigments and Paint Oils, by Maximilian Toch; Mixed Paints, by Henry A. Gardner; The Metallurgy of Iron and Steel, by Bradley Stoughton; Fertilizers, by A. G. Stillwell; Commercial Organic Chemicals, by Allen Rogers; Illuminating Gas, by W. H. Fulweiler; Coal Tar and Its Distillation Products, by F. E. Dodge; The Petroleum Industry, by Thomas T. Gray; The Destructive Distillation of Wood, by W. B. Harper; Oils, Fats and Waxes, by Carleton Ellis; Linseed Oil, by G. W. Thompson; Hydrogenation of Oils, by Carleton Ellis; Lubricating Oils, by Augustus H. Gill; Soaps and Soap Powder, by Lincoln Burrows; Glycerine, by A. C. Langmuir; Laundering, by W. F. Faragher; Essential Oils, Synthetic Perfumes and Flavoring Materials by Alois von Isakovics; Turpentine and Rosin, by Charles H. Herty; Resins, Oleo-Resins, Gum Resins and Gums, by Frederic Dannerth; Varnish, by A. H. Sabin; Sugar, by Guilford L. Spencer; Starch, Glucose, Dextrin and Gluten, by G. W. Rolfe; Brewing and Malting, by Robert Wahl; Wine Making, by L. W. Haas; Distilled Liquors, by Gustave L. Goob; Textiles, by J. Merritt Matthews; Dyestuffs and Their Application, by L. A. Olney; The Art of Paper Making, by G. F. Lull; Cellulose Industries, by Jasper E. Crane; Explosives, by O. W. Willcox; Leather, by Allen Rogers; Glue and Gelatine, by Jerome Alexander; Casein, by E. L. Tague; Practical Applications of Colloid Chemical Principles, by Jerome Alexander; Dehydrated, Dried and Evaporated Foods, Condensed Foods by Clarence V. Ekroth; Baking, by Arnold Wahl.

The Fall, 1923, Color Card. Issued by the Textile Color Card Association of the United States, 315 Fourth Avenue, New York City.

While summer is not yet here, and the American woman is busy selecting her wardrobe for beach and mountain resort, the Fall, 1923, Color Card is making

its appearance. A study of the colors which it portrays is a veritable trip along the road which Fashion has traveled since the days three thousand years ago when the Pharaohs and people of ancient Egype, not being versed in the art of dyeing, supplied color in their costumes by means of necklaces, bracelets, anklets, and earrings of gold, carnelian, lapis lazuli, turquoise and feldspar.

On the Color Card we find these same colors reproduced—the gold by burnished gold; carnelian by a range of three reddish brown shades—Carnelian, Egyptian Red, and Coptic; lapis lazuli by Hathor, slightly lighter in tone; and two other blues—Luxor and Blue Lotus. Turquoise Green and Amulet—two greens with slightly bluish cast—and three others, Feldspar, Egyptian Green, and Amarna, represent the feldspar tones, while Faience and Whirlpool are the blues of the faience enamel of which many of the Egyptian dishes and containers were fashioned.

But Dame Fashion has not confined herself to Egypt alone in her selection of colors for fall, 1923. She has passed over all the years elapsing since 1300 B. C. and has visited the ateliers of France and Flanders when, in the fifteenth century, tapestry making was at its height. Thus it is that we have three soft, clear blues —Sistine, Gobelin, and Flemish Blue—and three lovely rose shades—Blush Rose, Fragonard, and Tapestry Red.

From France and Flanders we are taken in imagination to Venice, Queen City of the Adriatic, in the days when ships laden with the riches of the Orient sailed into her canals, and when the marble halls of her magnificent palaces formed a fitting background for such brilliant colors as Old Coral and Doge—rose tones—and Florentine, a rich orange.

The spicy golden browns—Burma, Punjab, and Ginger—remind us of India, where the art of dyeing and coloring was known in the earliest ages, and from whose rich rugs comes the new deep India Red.

Persia, famous for the coloring and weaving of her wonderful rugs, gave us for a former card cool grayish greens, Tarragon and Eucalyptus, which have been recalled because of their popularity.

China contributes a warm orange tone, Mandarin, slightly darker than the shade Florentine which appears just above it, and forms a delightful combination with Pansy and Purple, recalled from the Standard Card.

New browns are Cigarette and Havana, lighter in tone than Tobacco, which has been brought back from the Standard Card.

Other colors which have been recalled are Long Beach and Sand; the grays Zinc, Pelican and Grebe; three dark blues, Ensign, Navy 1 and Navy 2, and Spark, a bright red.

Holly Berry is a new red most suitable in name and tone for winter. Withered rose is a restful color, brownish rose in tone as the name indicates. Peridot and Beetle are dark greens with a slightly yellow cast, and Antique Bronze is well described by its name.

Of the ten shoe, leather and hosiery colors, Beige, Thrush, Hazel, Mandalay, Congo, Silver, Fog and Cruiser have been put once more on Fashion's list because of their continued popularity. Distinctly new shades in this group are Log Cabin, slightly grayer than Otter of the Spring, 1923, Card, and a dark, rich shade called Autumn Brown.

Twelve colors appear in the woolen group. Camel's Hair, Sakkara and Biskra are true desert shades. Perique, because of the similarity in color, takes its name from a famous tobacco. A French peasant shade has been christened Normandy, and a darker blue is fittingly called Sailor. Phantom and London Smoke are dark grays. Monterey is a new and brilliant sports shade. Manzanita, the name and color typical of a California tree, is a reddish tone, and the list is brought to an end by two charming greens, Pine Tree and Everglades.

Taken as a whole, the Fall, 1923, Color Card of America, with its seventy-eight colors, is a splendid exponent of the progress of the standardization of color in America, and of the discriminating color sense which has been developed in American woman since the days when our Colonial ancestors confined their choice of apparel to the "Sadd Colors."

A Bibliography of Colloid Chemistry. By Harry N. Holmes. Published by the National Research Council, Washington, D. C. $1.00.

The National Research Council has recently issued a Colloid Bibliography in mimeographed form. The author, Dr. Harry N. Holmes, of Oberlin College, chairman of the National Research Council Committee on the Chemistry of Colloids, intends this edition to be preliminary to a more comprehensive one. Yet it is a book of 135 pages, containing 1,800 references on 106 topics. All the references are classified and many are accompanied by brief comment as an aid in deciding on their relative importance.

Among the classified groups are Adsorption, Asphalt, Baking, Biocolloids, Capillary Analysis, Casein, Cellulose and Cellulose Esters, Cements, Clays and Soils, Cleansing, Coagulation, Dialysis, Emulsions, Filtration, Flotation, Foam, Flour, Fogs, Gels, Gelatin, Glass, Glues, Gold, Gums, Hydration, Indicators, Jellies, Lubricants, Milk, Paints, Peptization, Petroleum, Photography, Protein Swelling, Protection, Rubber, Sewage, Silver, Soap, Sulphides, Surface Tension, Tanning, Ultramicroscope, Viscosity and Water Proofing.

The theoretical and industrial importance of colloid chemistry is now admitted without question. In fact, it links together the sciences of chemistry, physics, zoology, botany, geology, medicine, agriculture and even astronomy whenever that science deals with comets' tails. Few are the industries that do not have

colloid problems to solve. The average citizen is surprised to learn that his own body is colloidal in composition, that his digestive processes are governed by colloidal rules of action, and that the bacteria of disease are of a colloidal degree of dispersion. And he is astonished to learn that but for the colloidal adsorption of calcium phosphate from the blood stream by his bony cartilage he would be a mere spineless jelly fish. And as colloid chemistry is surface chemistry, it is of importance to this same average citizen to know that the total surface of his blood corpuscles is about one acre.

Plant and animal tissue is largely colloidal, too, and should be studied from that viewpoint.

Foreign Trade Opportunities

Reserved information may be obtained from the U. S. Bureau of Foreign and Domestic Commerce and its district and co-operative offices by duly registered firms and individuals upon written request by opportunity number. The bureau does not furnish credit rating or assume responsibility as to the standing of foreign inquirers; the usual precautions should be taken in all cases, and where no references are offered it does not necessarily imply that satisfactory references could not be given. Correspondence may be in English unless otherwise stated. Symbols: *Reported by American consular officers; †Reported by commercial attaches and trade commissioners; ‡Direct inquiries received by the bureau.

5950.‡—Textile, dry goods, buttons, toys, small hardware articles, drugs, and chemical products—Brazil. Manufacturers' agency.

5951.*—Cotton window curtains, counterpanes, colored goods, and bleached goods—Sweden. Purchase. Quotations, c. i. f. Swedish port. Terms: Payment against documents.

6360.†—Cotton yarns and calicoes or prints—Bucharest, Rumania. Purchase. Samples showing the kinds of yarn and cloth required were forwarded and may be examined at the bureau or its district offices. (Refer to file No. 8062.)

6363.†—Silk, cotton, and wool hosiery for men and women, underwear, and wearing apparel generally—Johannesburg, South Africa. Agency.

6366.‡—Cotton piece goods, silk piece goods, knit woolen underwear, and lard—Lima, Peru. Agency.

6369.†—Cotton and silk piece goods, notions, millinery, ribbons, etc.—Melbourne, Australia. Purchase or agency.

6371.*—Cotton, artificial silk, and silk hosiery—Karachi, India. Purchase.

6372.*—Cotton piece goods, bleached and gray, cotton and woolen mixtures; also imitation silks and sateens, widths preferred 28 to 30 inches, in lengths usually 30 yards, assorted qualities—Swatow, China. Purchase or agency.

6376.*—Automobiles and accessories, tires, leather and rubber boots and shoes, dental instruments, hosiery, leather, evaporated milk, cylinder oil; textiles, especially ginghams, underwear and woolen cloth; newsprint paper, stationery, typewriters, metals and scrap metal, and copper phosphate—Budapest, Hungary. Purchase and agency.

6435.*—Sundries, plated jewelry, artificial-silk hosiery, playing cards, cheap stationery, canned goods, cotton piece goods, particularly beach cloth, purchase desired; and agencies for cottage industrial machines, such as automatic knitters, weavers, drug mills, and chemical tablet machines—Madras, India.

6217.*—Colored cotton waste, 150 tons—Egypt. Purchase. Specifications may be examined at the bureau or its district offices. (Refer to file No. 90582.)

6219.*—Novelties, toilet requisites, fine chemicals, patent medicines, hosiery, gloves, laces, millinery specialties, knit goods, and other small lines—Melbourne, Australia. Agencies.

6224.‡—Enameled ware, iron beds and springs, glassware, chinaware, hosiery, and silk ribbons—Havana, Cuba. Manufacturers' agency.

6090.*—Condensed milk, California fruits, Carolina rice, and canned fish; cotton, wool, and silk socks, and underwear of all qualities—Bordeaux, France. Agency. Quotations, c. i. f. French port.

6105.*—Cotton yarn, hosiery, gray sheeting (cabot), sanitary appliances, and galvanized water pipes—Cairo, Egypt. Agency. Quotations, c. i. f. Alexandria or Port Said. Terms: Cash against documents.

6107.*—Ratine, gingham, voiles, and printed voiles—Montreal, Canada. Agency. Quotations, f. o. b. United States port.

6108.*—High-grade hosiery and women's underwear—Johannesburg, South Africa. Sole agency. Quotations, f. o. b. United States port. Terms: Payment against documents.

6111.†—Textiles, ribbons, underwear, hosiery, cotton prints, etc.—Johannesburg, South Africa. Manufacturers' agency. Quotations, f. o. b. New York.

6112.*—Cotton, silk, and wool hosiery, and cotton knit underwear for men and women—Goteborg, Sweden. Agency. Quotations, c. i. f. Swedish port. Terms: Cash against documents.

6113.*—Cotton, woolen, and silk piece goods, mill stores, etc.—Cawnpore, India. Agency. Quotations, c. i. f. Bombay or Calcutta.

6114.*—Wearing apparel, including millinery, of fine and medium grades; dry goods of cheap and medium quality; footwear; and hosiery, particularly for women—Durban, South Africa. Agency. Quotations, f. o. b. New York. Terms: Cash against documents.

6115.*—Cotton, silk, and woolen goods; and trimmings for suits, cloaks, and dress and waist manufacturing lines—Toronto, Canada. Agency.

6116.†—Textiles, including cotton piece goods such as cottonades, drills, galateas, and gabardines, and cotton, silk, and artificial-silk hosiery—Cape Province, South Africa. Manufacturers' agents desire representation.

6157.‡—Hosiery and underwear-knitting machinery, wool degreasing equipment, and paper box making machinery, to be operated by available electric current, for a $500,000 plant—Japan. Purchase.

6169.†—Cotton waste, including combers, card strips, fly waste, lint, linters, and Egyptian waste; cotton yarns, gray and white cotton goods, silks, velvets, and light woolens—Havre, France. Agency.

DYESTUFF MAN WINS PHILATELIC HONORS

At the International Stamp Exhibition recently held in London, Alfred F. Lichtenstein, president of the Ciba Company, was awarded three gold medals for specialized exhibitions of Swiss, Canadian and New Brunswick stamps. Mr. Lichtenstein is recognized as one of the leading American stamp collectors.

At the same exhibition, Arthur Hind, of Utica, N. Y., president of the Hind & Harris Plush Company, received a championship gold medal for his exhibit of rare United States stamps. He also won a second medal for the best general collection of rare stamps.

C. LEITH SPEIDEN MARRIED TO MISS LOUISE HYDE VALENTINE

Clement Leith Speiden, secretary of Innis, Speiden & Co. and assistant treasurer and secretary of the Isco Chemical Company, Niagara Falls, and Miss Louise Hyde Valentine, daughter of Mr. and Mrs. Charles A. Valentine, of New York City and Chappaqua, N. Y., were married May 19 in St. John's Church, Pleasantville, N. Y., by Rev. Dr. Glendenning, assisted by Rev. E. P. Burrill.

The maid of honor was Miss Frances Jackson and the bridesmaids were the Misses Julia Winslow, Dorothy Wheaton, Eleanor Speiden and Pauline Cauldwell. In the absence of Jack Speiden, the groom's brother, in China, Mr. Speiden was attended by Charles A. Valentine, brother of the bride. The ushers

C. Leith Speiden

were Walter A. Bridgemen, Edward V. Twombley, Edward De Selding and Manson Valentine.

The ceremony was followed by a reception on the lawn of the country home of the bride's parents at Chappaqua.

The bride was graduated from Vassar in 1921.

The bridegroom is a son of C. C. Speiden and a grandson of the late Dr. C. C. Speiden, of Marshall, Va. He is also a grandson of the late Lieutenant-General Sir George Leith Bart.

Besides being well known in the trade, Mr. Speiden has had an active career dating from his undergraduate days at Cornell, where he was prominent in athletics and president of the senior class of 1915. His war record began as early as 1916, when he served with the Essex Cavalry Troop on the Mexican border. In the autumn of that year he volunteered in organization work, was commissioned captain, and entered

upon his first active duties under General Leonard Wood in Charleston. He was later captain in charge of supplies at the Construction Camp at Atlanta.

His earnest desire for active work abroad was gratified in the early fall of 1917, when he crossed with the Third Division. After active service which took him through Chateau Thiery, St. Mihiel and the strenuous work in the Argonne, he went on with the Army of Occupation to Coblenz and Andernach. He secured his discharge in the spring of 1919 and resumed his work with Innis, Speiden & Co.

Mr. Speiden is interested in golf and tennis, is a member of the Canoe Brook Country Club, the Short Hills Country Club, the Drug and Chemical Club, the Cornell Club, Phi Gamma Delta, etc. He has lately made several trips abroad in the interests of his firm.

DU PONT ANNOUNCES PHOSPHINE 3R AND PONTAMINE DIAZO BLUE M

The Dyestuffs Department, Sales Division, E. I. du Pont de Nemours & Co., Inc., announces placing on the market the new product, Du Pont Phosphine 3R. This product is especially adapted for use on leather, and by the calico printers. It is considerably redder than Du Pont Phosphine G, therefore being suitable for heavy brown shades. It possesses very good solubility, and is particularly suitable for printing cotton goods on account of its fastness, solubility, and unusual concentration, being more than twice the strength of Du Pont Phosphine G.

Announcement is also made of a new diazotizable color under the name of Pontamine Diazo Blue M, which is diazotized and developed with beta-naphthol. This product discharges white with sulphoxylates, and does not bleed into the white. Its fastness to light and washing are superior to that of the direct dyeing colors. It is also very good in fastness to organic acids, weak alkalies and crocking, and resists well, cold and salt water, perspiration, steaming, mineral acids, ironing and caustic soda, and is suitable for dyeing cotton in all stages of manufacture, such as raw stock, yarns, warps and piece goods, as well as for the production of bright navy blues of Indigo shade on cotton hosiery. On artificial silk the shades obtained are very brilliant. It is also very suitable for use on pure silk on account of its general fastness.

FIRST INDIGO FORECAST, 1922-1923

Reports received from practically the whole area under indigo in British India indicate that the acreage for the 1922-1923 crop is 226,900, which is 4 per cent below the estimate at the corresponding date of a year ago. As compared with the final 1921-1922 figures (316,600 acres), the present estimate shows a decrease of 89,700 acres, or 28 per cent. The total yield of dye is at present estimated at 41,000 cwt., against 42,500 cwt., the estimate at this time last year. As compared with the final 1921-1922 figures, the present estimate shows a decrease of 33 per cent.—Indian Trade Journal.

NOTES OF THE TRADE

The A. Rosen Silk Corporation, New York City, was recently incorporated to manufacture textile fabrics; capital, $250,000. Incorporators are Abraham Rosen, Moe Rosen and Anna Rosen, all of New York City.

The Lyons Piece Dye Works, Paterson, N. J., have purchased property and are beginning the erection of a new plant to be used for the dyeing of yarns, having formerly handled the piece goods. In the future they will do all sorts of dyeing and finishing.

The Phoenix Silk Manufacturing Company has been dissolved and its business taken over by the Phoenix Silk Manufacturing Company, Inc., the transaction involving the consolidation of the Phoenix interests under corporate control. Benjamin B. Tilt is president, Albert Tilt vice-president and treasurer, and William S. Patten secretary; John B. Taylor is vice-president and general manager.

The New Brunswick Chemical Company, Newark, N. J., reports an active demand for its special Brunzol products. The new advertising campaign which the company has recently developed is bringing gratifying results and a widespread interest is being manifested in its sizing specialties. Particularly is this the case with Terpol Hydrate, which makes possible the use of low-priced starches, and with the company's Brunzol waterproofing compound and softeners.

The manufacture of thread and textiles, especially from cotton, has been developing in Ecuador for many years, and at present there are eleven thread and textile mills in Ecuador, all within the Quito district. One of these mills makes knit goods only. Their products are consumed in the country and also exported to southern Colombia. The industry is capitalized at approximately 20,000,000 sucres, employs about 10,000 persons, operates 15,000 spindles, and depends upon mountain streams for power. Its growth has caused the annual production of cotton to increase from 900,000 pounds to 4,000,000 pounds in the last six years.

WANTED—Copies of the February 26, 1923, and February 12, 1923, issues of AMERICAN DYESTUFF REPORTER. Owing to extra demand, our file copies of the above issues have been exhausted. Anyone willing to part with one or more of these copies will confer a favor by addressing this office. AMERICAN DYESTUFF REPORTER, 4109 Woolworth Building, New York City.

Calco

What Calco Specialization Means

Calco never offers a product for sale until it is being manufactured in quantities which assure absolute uniformity. Large quantity production of each color reduces manufacturing cost and insures certainty of prompt delivery.

The high place which Calco Methylene Blue has won in the field of dyes is an example of Calco Specialization. Calco has also concentrated on and perfected other colors. So well have these met the exacting requirements of dyers everywhere that many are accepted as standard. They are listed in an attractive booklet which will be sent upon request.

Write for samples of colors in which you are interested

THE CALCO CHEMICAL COMPANY
Bound Brook N. J.
New York Boston Philadelphia Chicago

Canadian Representative
DILLONS, Ltd.
Montreal Toronto

Things We Have Always Known

The recent business condition has brought to the forefront of thought many fundamental considerations that have always been known but have been damned with faint praise.

Human nature in the mass is very much like human nature in the individual. One of its dominant characteristics has been summed up in the observation, "You never miss the water till the well runs dry." We never appreciate fundamental things until we have occasion to do without them.

This observation has a special application to the Demand of the public for the products of industry. While the Demand was at high tide and everybody was busy trying to supply that Demand at a profit no one, seemingly, gave a thought to where the Demand came from, how long it might last, or what would happen if it should fail. We merely assumed the permanent existence of the Demand, just as we assume the presence of water, air, and fire.

But a day came when Demand began to subside, and in many industries it came almost to a full stop. And then we missed it, and realized, as never before, what an important thing it was. And we began to inquire where it came from in the first place, and how it might be restored.

We always knew — everybody knew—that Desire for things made a Demand for them in the market. That people desired things we accepted as an elemental fact. But when we discovered that Desire fluctuated we began to appreciate that Desire, as we know it, is a thing created by the art of man. It is a highly specialized form of an elemental need—just as a Louis XVI chair is made out of a tree.

This discovery led to another equally important discovery that the means of refining and specializing that Desire was Advertising. The gigantic work that has been accomplished by modern advertising now stands out in bold relief. It has been the means by which the refinements of civilization have been made known and made desirable, and this desire has been made into Demand. It is a simple fact that a million profitable forms of industrial activity owe their very existence to the fact that Advertising upheld the standards of living which in turn provided the demand for their products.

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